

A Briefing Paper on
PESTICIDE CONTAMINATION AND FOOD SAFETY

POISON

Vs

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CENTRE FOR SCIENCE AND ENVIRONMENT

NEW DELHI



The Centre for Science and Environment (CSE) is a public interest research and advocacy organisation based in New Delhi. The Centre researchers into, lobbies for and communicates the urgency of development that is both sustainable and equitable.

The scenario today demands using knowledge to bring about change. In other words, working India's democracy. This is what we aim to do.

The challenge, we see, is two-pronged. On one hand, millions live within a biomass-based subsistence economy, living at the margins of survival, the environment is their only natural asset. But a degraded environment means stress on land, water and forest resources for survival. It means increasing destitution and poverty.

The opportunity to bring about change is enormous. But it will need a commitment to reform — structural reform — in the way we do business with local communities.

On the other hand, rapid industrialising is throwing up new problems. Growing toxification and a costly disease burden. The answers will be in reinventing the growth model of the Western world so that we can leapfrog technology choices and find new ways of building wealth, which will not cost us the earth. This is the challenge of the balance.

Our aim is to raise these concerns and to participate in seeking answers and more importantly, in pushing for the answers to become policy and then practice. We do this through our research and by communicating our understanding through our publications. We call this knowledge-based activism. We hope we will make a difference.

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CONTENTS

Foreword: Democracy must be worked at	1
1. Pesticide residues in bottled water: found, regulated, cleaned?	3
2. The CSE study on pesticides in soft drinks	7
3. Defining and regulating safety	13
• The need for soft drink standards	14
• The politics of clubbing juices and soft drink	15
• Setting standards for water used in soft drink	16
• Setting standards for pesticide residue in sugar	18
• Setting standards for final product	19
• What government has now done to set standards	23
4. Regulating caffeine and other ingredients	25
5. Combating a global epidemic called obesity	29
6. Regulating against hazardous waste	33
7. Regulating against use of free groundwater	35
8. Food safety reform	41
• How the world regulates pesticides in food	42
• How India regulates pesticides	47
• How contaminated is Indian food	50
• How unsafe is our exposure to pesticide	53
• How to make our food safer	58
• How to break the circle of poison	60
9. Ensuring the right to clean water	61
Annexure: Draft Indian standards for carbonated beverages	69

FOREWORD

Democracy must be worked at

When the Joint Parliamentary Committee (JPC) was set up on August 22, 2003 to investigate the issue of pesticides in cold drinks, everyone told us that we had reached a dead end. Parliamentarians aren't interested, we were told. The issues were too technical, too contentious. Cynics added that with elections round the corner — the 2004 general elections were becoming a distinct possibility at that time — the committee's outcome was predisposed towards big money and powerful corporations. Overall, the consensus was that we had already lost.

This JPC was the fourth to be constituted in post-independent India. It was the first-ever on public health. The earlier three had deliberated on scams — from the Bofors scandal to the two stock market scams of the 1990s. This one was charged with determining if the Centre for Science and Environment (CSE) study on pesticide residues in soft drinks was correct or not, and to suggest criteria for evolving standards for soft drinks, fruit juices and other beverages, where water was the main constituent.

So the committee had to determine the veracity of our findings. But to do this, it had to understand both the science of the analytical study and the science of determining safety in food and drink. How much was safe? And, what was legally safe? In other words, the JPC also had to understand regulations on food safety, standard-setting and pesticide use. Crucially, members had to come to grips with the institutional framework for regulation and enforcement. This would require them to explore global best practices — what different countries do — so that a roadmap for reform could be suggested. It was a tough assignment for anyone, let alone busy parliamentarians in a time of election fever.

Our first interaction with the committee was stereotypical. Corporate disinformation had reached them: we were pushing European Union (EU) norms which would destroy Indian industry... it was a plot to weaken our trade... destroy our competitive advantage. In addition, we were seeking publicity sans science. We were not credible.

But their reaction changed as we stated our position. What stunned us was their willingness to be engaged in knowledge. There were hard issues at hand; they asked tough questions. But they also took their responsibility seriously. They were prepared to be informed, without arrogance or fixated minds, like that of 'experts'.

THE JOINT PARLIAMENTARY COMMITTEE (JPC) ON PESTICIDE RESIDUES IN AND SAFETY STANDARDS FOR SOFT DRINKS, FRUIT JUICE AND OTHER BEVERAGES

What were the JPC's terms of reference?

The Joint Parliamentary Committee (JPC) on Pesticide Residues in and Safety Standards for Soft Drinks, Fruit Juice and Other Beverages was constituted on August 22, 2003. The then Speaker of the Lok Sabha appointed Sharad Pawar as the chairperson of the 15-member committee (see box inset: JPC members).

The terms of reference of the committee were as follows:

- i. Whether the recent findings of the Centre for Science and Environment (CSE) regarding pesticide residues in soft drinks are correct or not; and
- ii. To suggest criteria for evolving suitable safety standards for soft drinks, fruit juice and other beverages where water is the main constituent.

This was only the fourth JPC in the history of independent India, and the first one on issues concerning health and safety of Indians.

JPC members

1. Sharad Pawar, chairperson
2. Ananth Kumar
3. Anil Basu
4. Avtar Singh Bhadana
5. Ramesh Chennithala
6. Dr Ranjit Kumar Panja
7. E Ahamed
8. Akhilesh Yadav
9. Dr Sudha Yadav
10. K Yerrannaidu
11. S S Ahluwalia
12. Prithviraj Chavan
13. Prasanta Chatterjee
14. Prem Chand Gupta
15. Sanjay Nirupam

For instance, we were asked: why did we want such stringent standards for pesticide residues in water? Industry had said that we were asking for the 'surrogate zero', an impossible standard. Would this not damage Indian industry and its competitiveness?

A fair question. Our reply was: we want tough standards for pesticide residues in water. Because the world over, regulators agree that pesticides serve no purpose in water. The World Health Organization has said that while pesticide residues in food could be acceptable (up to a limit), the same in water could at best be tolerated, but not accepted. Pesticides are 'economic toxins' — they must be used to grow food; and so a certain amount must be ingested in food. But pesticides in water are contaminants. Furthermore, technology to clean residues exists; the cost isn't prohibitive for industry. Most importantly, we argued, India cannot afford contamination, for the clean-up cost would be too high for all. Therefore, putting in place precautionary and preventive principles were vital to future water security.

We were certainly not asking for the same stringent standards (EU norms) for all industries. One regulation for the beverage industry as a whole, we added, was ridiculous. It would merely broaden the scope of the norm, weakening it. We wanted stringent regulations. But regulations for distinctly different categories of products — with different ingredients, technologies and scale of operations — would have to differ. In other words, you could not club soft drinks with fruit juices, or malt beverages.

We asked the JPC to consider the nutrition-poison trade-off in pesticide regulations. If toxins had to be ingested, we had to ensure nutrition in return. Therefore, regulations for pesticides in juices, milk, fruits or vegetables — essential and nutritive — had to be different from regulations for non-nutritive and non-essential products.

It became evident we were not asking for EU norms for all food. Again, that was senseless. We had to do what the EU or the US does: set our own pesticide residue standards keeping in mind our diet and trade interests. But our current standards were weak, and mindless about human health. The entire system of mandating and enforcing food safety standards had to be urgently overhauled. Trade and farmers' interests were equally at risk in the current system, we explained.

The parliamentarians listened. Their report sets out a firm and progressive reform agenda for food safety. It also indicts two of the world's largest corporations for the way they operate in India. This will be an important precedent to hold corporations accountable, in a world speedily globalising. It should teach mandarins of corporate social responsibility that even the most powerful industry prefers to hide behind weak domestic policy and regulations.

The report also puts the onus on our government to decide on policy in the interests of all. Most importantly, the report says that a government cannot abdicate its role as the protector of the health of its people. The JPC's indictment of the current system is almost absolute, as is its demand for change.

We have learnt. For democracy to succeed, it must be worked at. ■

— The CSE team

1

Pesticides in bottled water

A CSE study leads to stringent, compulsory standards



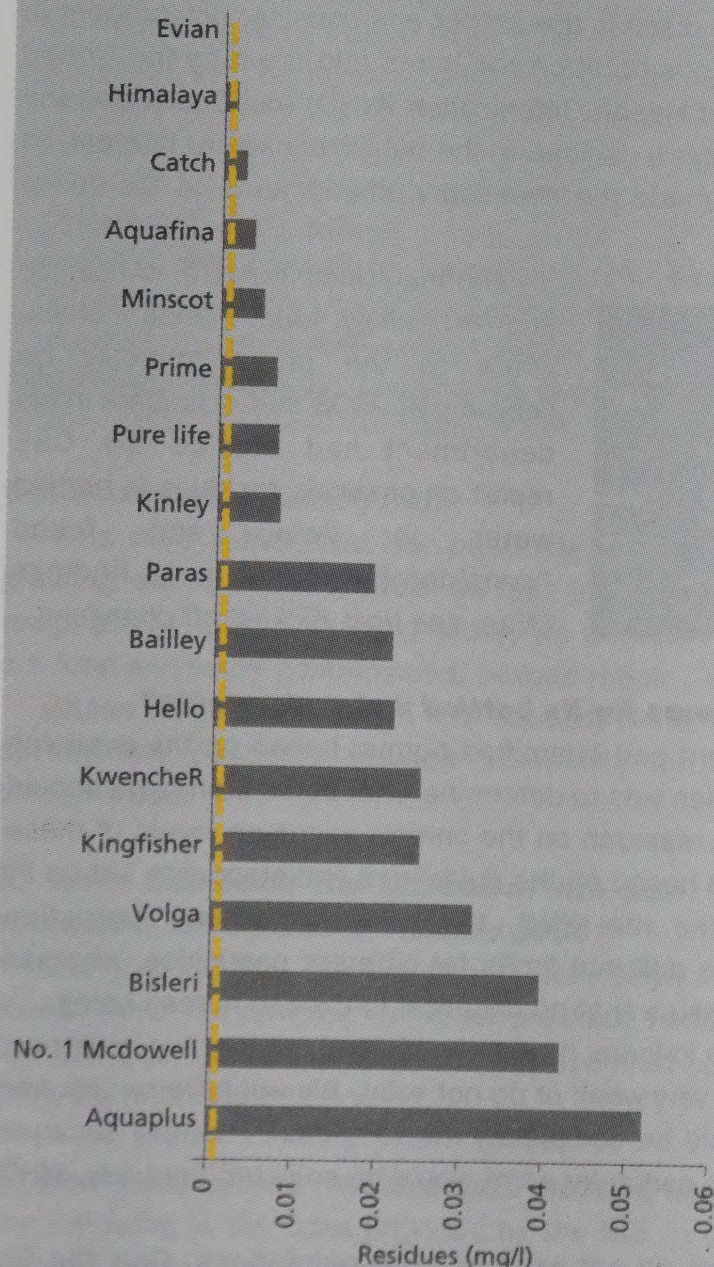
1. What was the CSE study and what did it find?

In February 2003, CSE's Pollution Monitoring Laboratory (PML) released an analytical study on pesticide residues in packaged drinking water and packaged natural mineral water, known as bottled water in common parlance. The laboratory tested 17 brands from Delhi and its adjoining areas and another 13 brands from the Mumbai region. All bottles, except for one, contained pesticide residues (see graph: *Gulp!*).

In the Delhi region, on an average, the total pesticides in all the samples were found to be 36.4 times higher than levels for maximum pesticide residues stipulated by the European Union (EU) for pesticide residues in bottled water

GULP!

The CSE study finds pesticides in all but one of the major bottled water brands



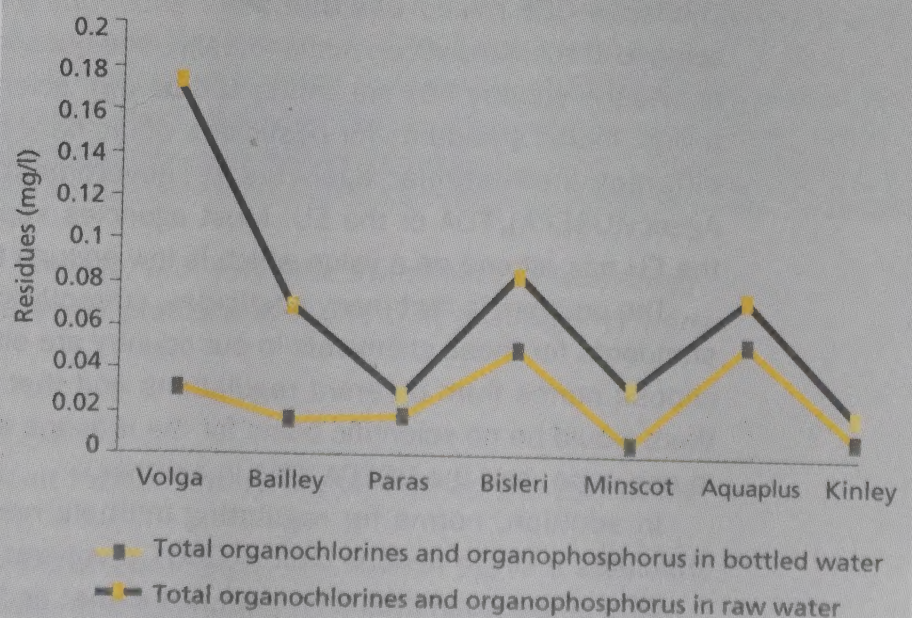
■ European Economic Commission Directive 80/778/EEC maximum residue limit for total pesticides (0.0005 mg/l)
 --- Total organochlorines + organophosphorus

2. Where were the pesticides coming from?

CSE researchers collected groundwater samples — the raw material for bottled water is groundwater — from manufacturing plants. On testing, a correlation between the pesticide found in the borewell and that in the finished product was established. All the samples of groundwater taken from inside the factory were found to be contaminated with the same pesticides as found in the finished product (see graph: *The raw and the cooked*). It was evident the pesticides were present in the raw water and the companies were cleaning it to varying degrees.

THE RAW AND THE COOKED

A perfect correlation between raw material and final product



■ Total organochlorines and organophosphorus in bottled water
 ■ Total organochlorines and organophosphorus in raw water



COURTESY: INDIAN EXPRESS

3. Government regulations did not detect the pesticides. Why?

The Indian standards for pesticide residues in bottled water were the problem. The Bureau of Indian Standards (BIS) has stipulated norms for pesticide residues. The norms say: "Pesticide residues shall be below detectable limits." This, you would assume, should mean that there should be no pesticide residues found in bottled water, or in other words, there should not be any residues in the bottle. But no, it actually means that you should not be able to *find* the pesticide residues in the water. The BIS has specified the methodology for detecting pesticide residues and this methodology, not very sensitive, will not detect pesticides unless they're present in extremely high quantities.

This is why the CSE study compared the residue levels to standards for drinking water and bottled water laid down by the European Economic Commission. These standards, unlike those of the BIS, specify an empirical limit for individual pesticide as well as total pesticides permissible in the water.

4. What happened after the release of the CSE report?

The government issued a notification revising the standards for pesticide residues in bottled water on July 18, 2003 — amendment to Prevention of Food Adulteration (1st Amendment) Rules 2003. The notification was issued after receiving reports and recommendations of committees set up to examine the CSE report, as well as comments from industry on the proposed standards.

This process began when the then Union minister of consumer affairs, Sharad Yadav, informed Parliament that "taking cognisance of the study conducted by CSE... an emergency meeting of the relevant sectional committees was called on February 7, 2003 to discuss the matter and consider amendment in the standards.... These committees, after taking into consideration the limits laid down by the United States Food and Drug Administration (USFDA), EU, World Health Organization (WHO) and Codex and the fact that bottled water is a value-added product, unanimously decided in the public/consumer interest, to quantify the maximum limit for pesticide residues and made the necessary amendments to the above Indian standards."



The then Union minister of science and technology, Murli Manohar Joshi, wrote to the prime minister on February 9, 2003 that scientists in his department had studied the CSE report on pesticide residues in bottled water in detail and found "considerable merit" in its findings (Also, see box: *Kicking off change*).

5. Why did India adopt the EU pesticide residue norms for its bottled water standards?

The issue CSE raised was that there should be stringent and quantified norms, based on the available science of their impact on human health. The question then was to determine what these standards should be. As the country has not conducted its own scientific research on the chronic exposure levels of these toxins, Indian standards for pesticides would have to be based on the guidelines and standards set up by different international agencies or governments, like the WHO, the US Environment Protection Agency (USEPA)/FDA or the EU. Most agencies stipulate different limits for different pesticides, whereas the EU has agreed on a value which is low enough to ensure that no chemical is toxic to human beings.

The problem is that many pesticides, currently in use in India, have been phased out in other countries; standards for these chemicals in our country are either very weak or do not exist. We will have to pick and choose norms from different regulations and that would be completely meaningless — simply because there would be no scientific basis for the reasons why a particular norm would be selected from say, WHO in one case, and the USEPA/FDA in another.

In addition, norms for regulating multiple residues do not exist in most regulations. Only the EU stipulates a single residue limit (0.0001 ppm) and multiple residue limit (0.0005 ppm).

This single quantified limit makes it easier and much cheaper for the regulator to enforce. Otherwise, we will have to regulate all the different pesticides in use in the country in bottled water. The cost of doing

KICKING OFF CHANGE

Excerpts from the Satwant Reddy Committee report on pesticide residues in packaged drinking water and packaged natural mineral water, March 25, 2003 — which kicked off the reforms in food safety

On setting standards:

- BIS should have a core group of scientists from various fields to keep track of recent scientific and technical developments in critical areas. The present system of review of standards after every five years is not adequate.
- For the sake of transparency, the constitution of the various committees, panels or such bodies involved in standards formulation should be on the web. This would exert covert pressure on members; each had a reputation to protect.
- It is sometimes stated that vested interests, particularly of big industrial houses, influence the standard formulation activity of BIS. This criticism emanates from the fact that standard formulation is a voluntary activity and BIS does not pay anything for participation in meetings of the technical committees. At times the participation of scientific and consumer organisations remains on paper, while industry participates more actively. Therefore, there is an urgent need to take remedial measures to get over this problem.

On implementing standards:

- Enforcement of BIS Act needs to be strengthened. Search and seizure operations are carried out on the basis of specific complaints. Prosecution does not reach its logical conclusion for several years.
- BIS should review its internal capacity before accepting further responsibility. But once it accepts the responsibility (such as testing bottled water), it must discharge it faithfully and not cite lack of human resources as justification for non-adherence to norms.
- There is a need for BIS to revitalise its core competencies. Existing procedures, formulated several years ago, are shrouded in secrecy and confidentiality. These may be reviewed by expert groups, to achieve maximum transparency.

On drinking water policy:

- In developed countries, there is only one standard for drinking water and countries are expected to ensure that all drinking water for human consumption, whether it is made available through the distribution network or in containers, conforms to those standards. In India, why should these standards be limited to bottled water alone, which after all is consumed by the privileged? It is time that consumers demand pollution — free drinking water and municipal machinery gears itself up to meet this rightly demand.

On groundwater policy:

- A water recharging system should be made mandatory for the bottled water industry. Before licence renewal, a no-objection certificate should be obtained from concerned monitoring agencies. There should be some guidelines regarding selection of a site where a bottled water plant is to be installed, to ensure that it is free from pollution. Disposal of waste from water purification plants needs to be monitored.

that would be prohibitively high.

It is also a fact that our pesticide use is growing enormously. Unless we put in place tough norms for this industry today, we will find our food and water contaminated beyond repair.

These issues were taken into account while setting the pesticide residue standards for bottled water.

6. What has been the impact of the new standards, introduced in January 2004?

According to reports, the companies have been able to meet the new standards for pesticide residues in water, with very little investment in technology. The BIS has recently checked all the licensed bottled water plants and found that the majority were adhering to the new standards.

7. How many plants 'manufacture' bottled water?

The following is the data provided by the BIS to the Joint Parliamentary Committee on the number of licensed bottled water units:

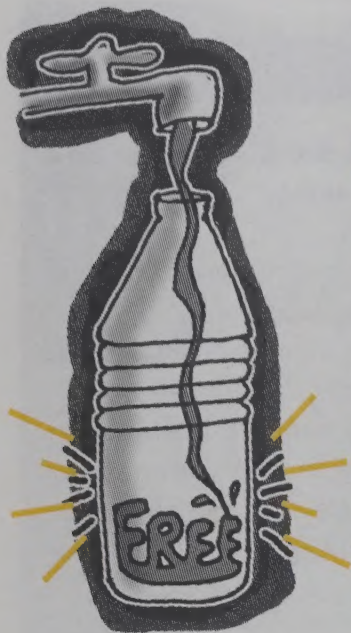
- Number of licensed packaged drinking water manufacturers: 996
 - Number of licensed packaged natural mineral water manufacturers: 7
- Total: 1,003

NEW BOTTLED WATER STANDARDS: IN EFFECT SINCE JANUARY 1, 2004

Ministry of health and family welfare notification, February 18, 2003. Notified on July 18, 2004

- (i) Pesticide residues considered individually — 0.0001 mg/litre (ppm)
- (ii) Total pesticide residues — 0.0005 mg/litre (ppm)

It also recommended that a total of 32 pesticides should be screened and analysed by an accredited laboratory, using internationally established test methods.



In addition, there would be many unlicensed plants producing and supplying water across the country.

8. What does it cost to 'manufacture' water?

Companies do not pay for the raw material — groundwater — in almost all the cases. Even water treatment costs, using the best available technology, are a minor component of their expenses.

The breakdown of the costs of a one litre bottle is broadly as follows:

- Water treatment cost (using the best available technology): Rs 0.25
- Cost of plastic bottle: over Rs 2
- Packaging cost: Rs 1.25
- Transportation cost: Rs 0.10-0.25

Over and above this, companies pay sales tax and excise to the government.

This bottle costs us Rs 10 in the market.

2

Pesticides in soft drinks, too

What the CSE study was all about, and what happened thereafter

What the JPC says:

"Though the results of the Central Pollution Control Board which had conducted an independent testing through their laboratory, come closer to the findings of CFL-CFTRI and CFL, Kolkata, the percentage reported by Shriram laboratory which had tested only one sample each of Coca Cola and Pepsi is quite high. In view of the fact that these laboratories also did not test identical samples and the dates of manufacturing as well as locations are different, the quantitative results reported by them cannot be compared.

"The Committee, however, find that the CSE findings are correct on the presence of pesticide residues in carbonated water strictly in respect of the 36 samples of 12 brand names analyzed by them. The Committee also appreciate the whistle blowing act of CSE in alerting the nation to an issue with major implications to food safety, policy formulation, regulatory framework and human and environmental health."

— Report of Joint Committee on Pesticide Residues in and Safety Standards for Soft Drinks, Fruit Juice and other Beverages, Chapter I, Conclusions/Recommendations 1.95-1.96

1. Why did CSE test soft drinks?

We, at CSE, had no intentions of following up our study on pesticides in bottled water with investigations in other products. But people wrote to us from across the country. They wanted to know: if what we had to say about the bottled water industry was correct, then what about soft drink manufacturers? After all, they all used water as a raw material. They also sourced their water largely from groundwater.

It was evident that the government was prevaricating on legislating the new stringent norms for bottled water. Most of the big players in the bottled water industry, we knew, had the capability to treat and clean the water. We asked ourselves: were the stakes even higher than imagined? Suppose what was really at stake was not the bottled water industry and its Rs 1,000 crore business, but the soft drink industry and its estimated Rs 6,000-7,000 crore business! On an average, Indians drink 6.6 billion bottles of soft drinks each year and the business is flourishing. This made us check the soft drink bottles for pesticides.

2. How were the tests done and what were the results?

The tests were conducted at CSE's Pollution Monitoring Laboratory (PML) in New Delhi. Twelve brands of soft drinks sold in Delhi were analysed for 16 organochlorine pesticides, 12 organophosphorus pesticides and 4 synthetic pyrethroids — all commonly used in India in agricultural fields as well as in homes.

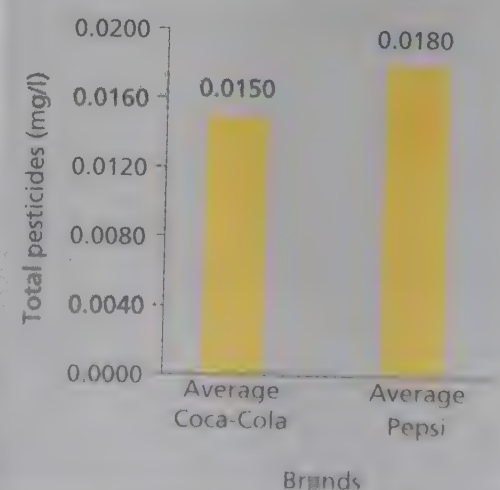
The samples were analysed using the USEPA method 8081A for organochlorines and USEPA method 8141A for organophosphorus compounds. The analysis was done using gas chromatography capillary column technique (see graphs: *Total pesticides count* and *brand pestilence*; see table: *Average residues in the samples*). We also checked against Coke and pepsii bottles manufactured and sold in the US. No residues in pesticides were found.

3. Why did CSE target the two soft drink giants exclusively?

CSE did not target Coke and Pepsi, but all soft drinks. But as only two companies — both US multinationals — control over 90 per cent of the soft drink market in India, having bought over all other brands, there was nothing CSE could do.

TOTAL PESTICIDES COUNT

30 and 36 times higher than EU norms in Coke and Pepsi, respectively





AVERAGE RESIDUES IN THE SAMPLES

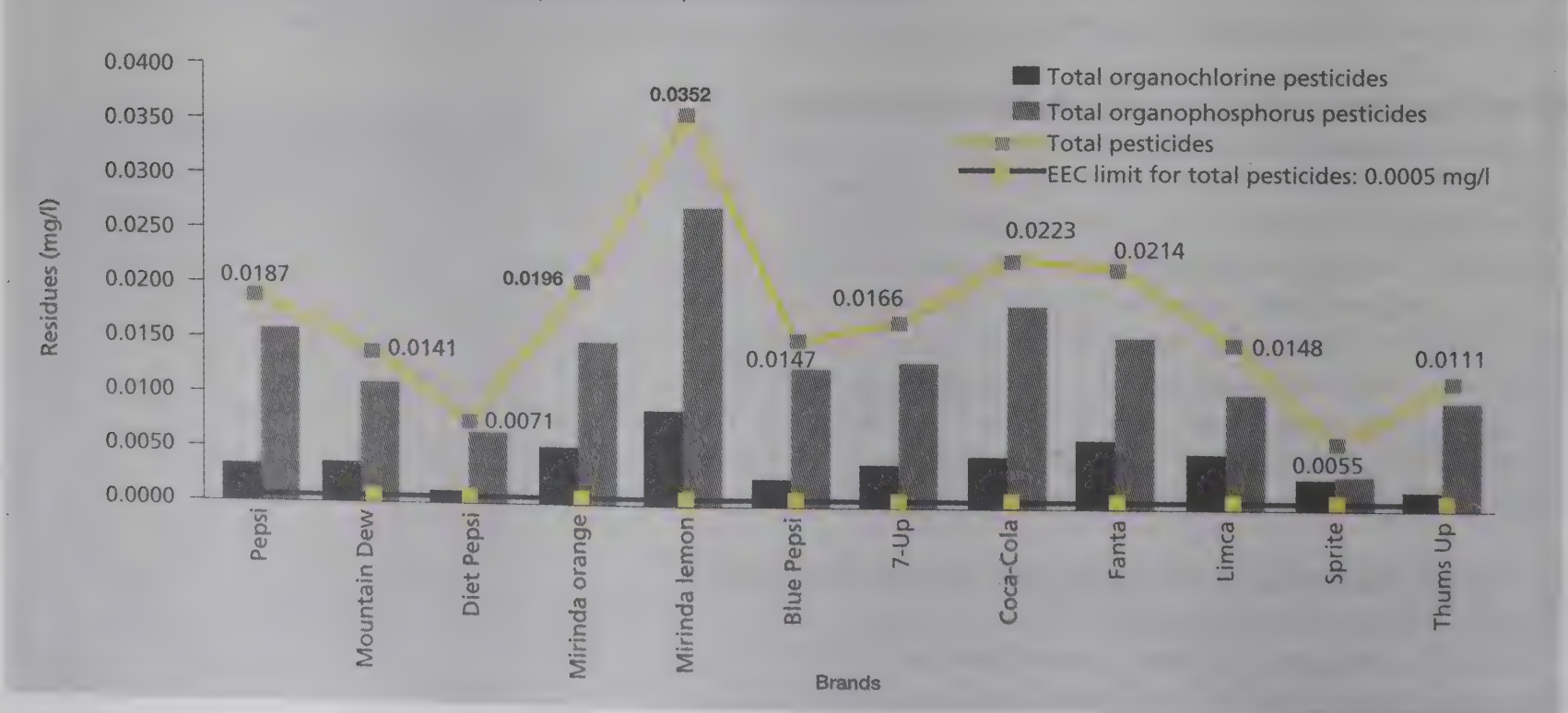
11-70 times the EU norm for total pesticides

S no	Brand	Total organochlorines (mg/l)	Total organophosphorus (mg/l)	Total pesticides (mg/l)	EEC limit for total pesticides 0.0005 mg/l	Deviation from EEC limit (no of times)
1.	Pepsi	0.0032	0.0155	0.0187	0.0005	37
2.	Mountain Dew	0.0033	0.0108	0.0141	0.0005	28
3.	Diet Pepsi	0.0008	0.0063	0.0071	0.0005	14
4.	Mirinda Orange	0.0050	0.0146	0.0196	0.0005	39
5.	Mirinda Lemon	0.0084	0.0268	0.0352	0.0005	70
6.	Blue Pepsi	0.0022	0.0125	0.0147	0.0005	29
7.	7-up	0.0036	0.0130	0.0166	0.0005	33
8.	Coca Cola	0.0044	0.0179	0.0223	0.0005	45
9.	Fanta	0.0060	0.0154	0.0214	0.0005	43
10.	Limca	0.0047	0.0101	0.0148	0.0005	30
11.	Sprite	0.0027	0.0028	0.0055	0.0005	11
12.	Thums Up	0.0015	0.0096	0.0111	0.0005	22

Note: Average of 3 samples. Source: Analysis of Pesticide Residues in Soft Drinks, Centre for Science and Environment, New Delhi, 2003, pg 13 .

BRAND PESTILENCE

All samples of the 12 brands contained poisonous pesticide residues



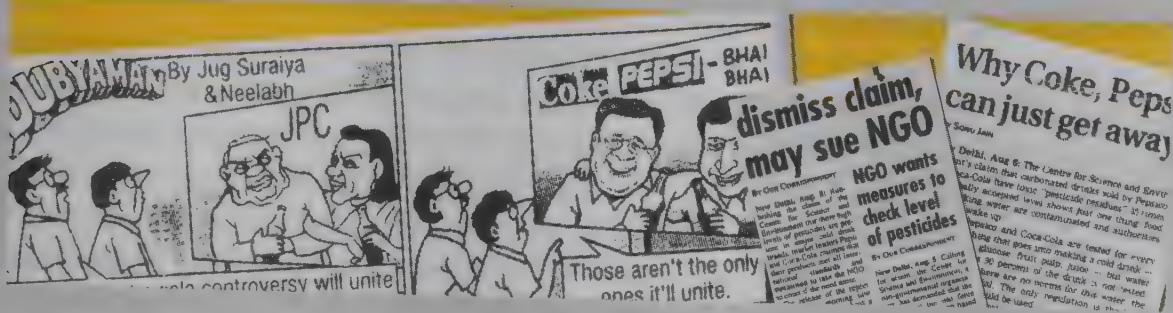
WE LEARN ABOUT SLAPP

Hours after CSE released its analysis on pesticide residues in soft drinks on August 5, 2003, the two companies — PepsiCo and Coca-Cola — convened a joint press conference to condemn the report and to question the credibility of our testing laboratory. They then followed it up with a public relations blitz. The strategy was simple: denigrate the report, the institution and the individuals who work there. In that process, the findings of the report will also be rubbished.

Then on August 10, PepsiCo filed a writ petition in the Delhi High Court, which took the view that CSE was a "a non-governmental organisation having no legal authority or recognition" and therefore, "the report prepared by a private person does not have any sanctity in law and could not have been binding upon any person, much less the governmental authorities." In its writ, Pepsi asked for directions from the court to stop CSE from publishing statements and to withdraw all such materials from circulation and from its website. Coke's petition was not accepted by the Supreme Court.

PepsiCo was practising what is a tried and tested strategy in the US. Such lawsuits, where the rights of individuals or institutions to bring matters of public interest to the notice of the public are questioned, are common there. Common enough to be given a name: Strategic Lawsuits Against Public Participation, or SLAPP for short. A typical SLAPP case in the US would involve business operations suing individual citizens or small non-profit groups because they have communicated their views publicly or tried to influence government action.

SLAPPs amount to silencing people into submission. They are not just "intimidation lawsuits". They question the rights of individuals and institutions to speak out on a public issue, and to communicate their views to government officials. When TV show host Oprah Winfrey discussed the mad-cow disease on her show and said that the fears of the disease "just stopped me cold from eating another burger", she was sued for defaming cattle. It took her four years and over US \$1 million to be vindicated in court. Similarly, when a resident of Rhode Island wrote a letter complaining about contamination of local drinking water from a nearby landfill, she spent five years defending herself against the company, which charged her with "defamation" and "interference with prospective business contracts."



Industry likes this strategy. It argues that the environmental movement is imposing avoidable costs on the consumer. Therefore, it believes there is a need for laws so that corporations can effectively sue, chastise and punish their enemies.

DOES PEPSI OR DOES PEPSI NOT

A few holes in PepsiCo's arguments...

In the writ petition in Delhi High Court against CSE filed on August 10, 2003, PepsiCo stated: "Because the First Respondent would have found, upon such investigation and enquiry, if it would have taken the trouble of initiating one, that products of the Petitioner, particularly carbonated soft drinks, adhere to such standards and norms that are much more stringent than those insisted upon internationally."

But the government reports (CFTRI and CFL) found pesticide residues 1.2 to 5.22 times higher than the EU limit for total pesticide residues in drinking water in 75 per cent of the samples. The government admitted that "the assertion of the soft drink manufacturers that their product is within the EU limits has also not proved to be correct for 100 per cent of the samples".

The Hon'ble High Court noted in its order dated August 11, 2003:

"At present, it is an admitted position that there are no standards with regard to the presence of pesticides in soft drinks in India. It is for this reason that respondents 5 and 6 have particularly brought this to the notice of the people at large that in India there are no such standards as exists in other countries including the United States of America and in Europe with regard to the presence of pesticides in soft drinks."

This, when PepsiCo in its writ had taken the stance that "Because, the petitioner maintains and adheres to its own quality standards and norms; which have been formulated by PepsiCo Beverage International, USA which conform to and is consistent with EU norms, which are far more stringent than those prescribed by WHO and the Directives issued by EU as also those prescribed by United States Environmental Protection Agency and the Food and Drugs Administration of USA."

CSE then simply asked that as this was the position taken by the petitioners in writ to the Hon'ble High Court, the Court should direct the government to examine the best and safest norms in respect of all aspects of the process, inputs and final product in so far as soft drinks beverages are concerned.

As the counter was filed, PepsiCo withdrew the case from the Court. Quietly.

WHAT DID SUSHMA SAY?

On August 21, 2003, Sushma Swaraj, the then Union minister for health and family welfare, made a statement in the Lok Sabha on reports of pesticide residues found in soft drinks. In her statement, she disclosed the results of the tests on soft drink samples conducted by the two government laboratories (CFTRI-Mysore and CFL-Kolkata). While she dwelt at length on the variance in the results of these tests and those conducted by CSE, she neglected to inform Parliament of a vital point that both the government labs made in their report: that their test results were not comparable to those by CSE as the samples and batches in all the cases were different. Sushma pointed out that “the

assertion of the soft drink manufacturers that their product is within the EU limits has also not proved to be correct for 100 per cent of the samples”.

She also asserted that “the soft drinks tested (were) well within the safety limits prescribed for packaged drinking water at present”. But the existing packaged drinking water standards were already under review because they were unsafe!

The soft drink industry took this statement as an ‘official clean chit’ for its products. PepsiCo issued an advertisement in which it quoted Sushma, saying “All these (soft drinks) are within safety limits”. But even as Sushma sought an “unconditional apology” and withdrawal of the advertisement from PepsiCo, the damage had been done. A clean chit had been given.

**4. What are the EU standards for pesticide residues in water?**

The EEC or European Economic Community’s Directive (80/778/EEC) on “quality of water intended for human consumption” — regulated at the European level — sets maximum admissible concentration for individual pesticides and related products in drinking water at 0.1 µg/l (0.0001 mg/l or ppm). The EEC also stipulates the limit for total pesticides at 0.0005 mg/l or ppm. This directive has been replaced by Directive 98/83/EEC with effect from December 25, 2003. The limit for pesticides is the same as in the earlier directive, except for aldrin, dieldin, heptachlor and heptachlor epoxide for which the parametric value has been made even more stringent at 0.030 µg/l (0.00003 mg/l).

5. Why did CSE benchmark against EU standards and not those of the WHO?

CSE compared pesticide residue regulations across the world before deciding to benchmark the results against the EU drinking water standards, used to regulate soft drink manufacture. The EU norms were chosen for the following reasons:

- India does not have standards for pesticide residues. However, the guidelines of the BIS and Central Public Health and Environmental Engineering Organisation (CPHEEO) mention that pesticide residues should be “absent”. The guidelines thus set a precautionary approach, which CSE followed as well.
- No other institution — including the WHO or the USEPA — has pesticide residue standards for all the pesticides being used in India. Most agencies stipulate different limits for different pesticides. Picking and choosing norms from different regulations would have been completely meaningless because there would be no scientific basis for why a particular norm would be selected from say WHO in one case and the USEPA in another. The EU norms are the only ones, which have agreed on a single value, which is low enough to ensure that no chemical is toxic to humans.
- Norms for regulating multiple residues do not exist in most regulations. Only the EU stipulates a single residue limit (0.0001 ppm) for individual pesticides and a multiple residue limit (0.0005 ppm) for all pesticides taken together. This single quantified limit makes it easier for the regulator to enforce.

6. How do the pesticides found by CSE in soft drinks affect our health?

Lindane, DDT and its metabolites, chlorpyrifos and malathion are all harmful for human health. They accumulate in human bodies, and their impact over time can be deadly. It is well understood that pesticides are tiny toxins and exposure over time in small (tiny) doses leads to chronic health impacts. It is now well documented that the exposure to pesticides lowers the body’s ability to fight diseases (an immunosuppressive effect), which in turn triggers diseases like cancer and asthma (see box: Killers all).

KILLERS ALL

Lindane was banned in India in 1997. It is absorbed through the respiratory, digestive or cutaneous routes and accumulates in fat tissues. It damages the human liver, kidneys and the neural and immune systems, and induces birth defects, cancer and death. Chronic intake results in endocrine disruption in birds as well as mammals. Lindane is also a potent carcinogen; rats exposed to it showed evidence of liver cancer.

DDT and its metabolites have been linked to altered sexual development in various species, decrease in semen quality, spontaneous abortion, reduced bone mineral density and increased risk of breast cancer in women. Banned for use in agriculture, it is still used against a wide variety of insects in public health programmes. DDE, one of the metabolites, decreases fecundity and fertility of fishes; reproductive development of both males and females may be impaired.

Chronic exposure to chlorpyrifos has been shown to cause immunological change. Foetal and childhood exposures to chlorpyrifos have raised concerns about developmental neurotoxicity. Chlorination, commonly used treatment of domestic water supply, causes the transformation from chlorpyrifos to chlorpyrifos oxon, making it more toxic.

Malathion has been shown to cause birth defects in a variety of wildlife and at levels lower than other pesticides. Neonates (newborn babies) are far more sensitive to these agents than adults, mainly because of a slower rate of detoxification of the metabolite (the metabolite in this case would be the liver breakdown product of malathion — malaxon which is far more toxic than malathion itself).

7. What were the findings of the government laboratories, directed to test soft drinks for pesticides?

The Directorate General of Health Services (DGHS) directed the Central Food Laboratory under the Central Food Technological Research Institute (CFTRI), Mysore and the Central Food Laboratory, Kolkata to analyse samples of 12 brands of soft drinks each sent by it.

It is still not clear how the samples for analysis were collected by the DGHS — from the open market or from bottling plants, and by whom — government or company officials.

The labs found pesticides but in lower levels than CSE. Nine of the 12 samples had residues that were above EU limits. While CSE found pesticide residues 11-70 times more than the EU limits, CFTRI and CFL found them to be 1.2-5.2 times higher. The Union minister of health and family welfare laid a statement containing the reports from these two laboratories in Parliament on August 21, 2003 (see box: *What did Sushma say?*)

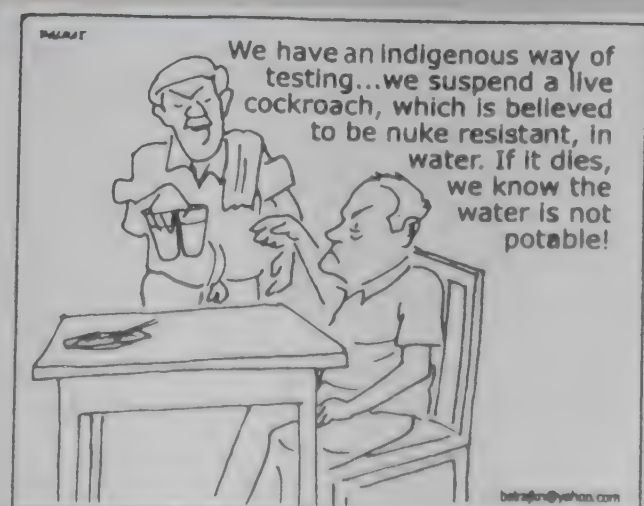
8. The results of all the labs differed. Why?

The report of CFTRI admitted that their findings were not comparable with CSE because of the differences in samples and their batch numbers: "As the samples analysed at CFL, CFTRI, Mysore were entirely from a different batch than the CSE samples, the results obtained are not comparable with the results of CSE", said the report. Government did not reveal this fact to the Parliament.

LABORATORY ACCREDITATION PROCESS IN INDIA

Laboratory accreditation is a procedure by which an authoritative body gives formal recognition of technical competence for specific tests/measurements based on third party assessment and following international standards. The National Accreditation Board for Testing and Calibration Laboratory (NABL) is an autonomous body under the aegis of Department of Science and Technology, Government of India, and is authorised as the sole accreditation body for testing and calibration laboratories in India. The NABL is a voluntary third party accreditation programme.

India, according to the NABL website (<http://www.nabl-india.org/nabl/asp/users/labSearchR.asp>), has 645 accredited laboratories, out of which just 12 are accredited to test for pesticides.



CHRONOLOGY: POST-AUGUST 5 2003

● **AUGUST 6, 2003:** Issue discussed in Lok Sabha; members express serious concern over the finding of pesticide residues in soft drinks and ask government to explain. Soft drinks banned from Parliament premises. Sushma Swaraj, the then Union minister of health and family welfare, orders testing of soft drink samples at government laboratories — the CFTRI in Mysore and the CFL in Kolkata.

● **AUGUST 21, 2003:** Swaraj presents the results of tests conducted by the government labs. Gives a statement on the matter in Parliament: admits the tests did find pesticide residues, but says the levels were “well within the safety limits as per existing standards of packaged drinking water”. However, ignores something the reports clearly state — that their findings were not comparable to CSE findings as samples were different in both cases. Outcry from opposition against the minister’s statement. Demand for formation of a Joint Parliamentary Committee (JPC) to look into the issue.

● **AUGUST 22, 2003:** Government announces JPC, chaired by Sharad Pawar.

● **AUGUST 26, 2003:** The Union government issues a draft amendment notification of the PFA, 1955 to regulate beverages and other food products. Clubs all beverages into one category and stipulates stringent standards for all.

● **JANUARY 27, 2004:** The JPC adopts its report unanimously.

● **FEBRUARY 4, 2004:** JPC report is tabled in Parliament. Upholds the CSE findings. Whistleblowing act of CSE appreciated. Makes a wide range of recommendations on food safety issues.

● **FEBRUARY 13, 2004:** Emergency meeting of the Central Committee on Food Standards (CCFS) called to discuss the JPC report. Report endorsed; committee says it will finalise standards for the drinks urgently.

● **JUNE 23, 2004:** The Pesticide Residues Sub-Committee of the CCFS meets to finalise standards. However, committee recommends year-long monitoring of pesticide residues in soft drinks, before standards are fixed.

● **JULY 15, 2004:** Bureau of Indian Standards (BIS) finalises draft standards for soft drinks, based on JPC recommendations; standards are for the final product, include pesticide residue standards and global best standards for caffeine. The draft standards are available for public comment till August 31, 2004. If accepted, these would be the world’s first standards for pesticide residues in soft drinks. (see section on standards)

● **JULY 27, 2004:** The Union ministry of health and family welfare issues a notification specifying that the quality of water, which will be used in the manufacture of soft drinks must meet the bottled water standards.

9. While CSE found malathion, government labs did not. Was CSE wrong?

In the CSE analysis, malathion was found present in 97 per cent of the samples. The CFTRI, Mysore and CFL, Kolkata could not detect malathion in any of the samples tested by them.

This issue became extremely contentious as government and companies tried to use this missing malathion to discredit the CSE study. A number of presentations were made to the Joint Parliamentary Committee on how CSE had got its malathion analysis wrong and that this fact showed that its study was not reliable.

However, when it was revealed that malathion was also detected in tests conducted by the Central Pollution Control Board (CPCB) and the Bangalore-based Shriram Scientific and Industrial Research Foundation laboratory, it then became difficult for the detractors to sustain their argument on this issue.

10. Which other labs tested soft drink samples? What were their findings?

The CPCB conducted an independent analysis of samples of six brands of soft drinks collected from various markets in Delhi. Its test detected malathion in all the samples: the residue levels found were 3.1-7.2 times higher than EU limits.

The Directorate of Health Services, Government of Kerala had also sent a sample each of Coca-Cola and Pepsi for analysis to the Shriram Scientific and Industrial Research Foundation laboratory, Bangalore. The residue levels found by the lab — incidentally, the only accredited lab among all that had tested soft drink samples — were a frightening 17-419 times higher than EU limits.

11. Is the CSE laboratory accredited to test pesticides? If not, are its tests valid?

The CSE laboratory is not accredited to test pesticides; in fact, very few labs in the country are. (see box: *The Laboratory Accreditation Process in India*). In the meantime, the CSE lab practices what are called good laboratory practices. While its unaccredited status has been the focus of criticism from various quarters, the CSE lab has a track record that cannot be ignored.

12. Is it difficult to test soft drinks as claimed by soft drink firms?

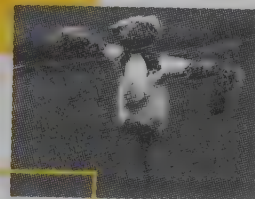
The soft drink firms have contended that their products are “very complex” and hence, difficult to test. As 99 per cent of a soft drink product is made up of only two individual components — water and sugar — the product is hardly complex; in fact, soft drinks are regularly tested the world over.

If testing soft drinks is difficult, it would be impossible to test milk, for instance, which has protein, lactose, fats, minerals and water; but milk is routinely tested and analysed all over the world, including India.

3

Safety first

Companies say their products are safe. Let us understand how safety is defined



1. *Safety is about meeting a regulatory standard for pesticide contaminants*

The presence of pesticide residues in water is completely unacceptable, because a pesticide has no reason to be present in water. Pesticide presence in food commodities, on the other hand, can be explained; a pesticide might be used to produce these food commodities. However, pesticides can only be tolerated and different countries regulate pesticides differently keeping this principle in mind.

In the case of soft drinks, all laboratory tests — by CSE, and by CFL, CFTRI, CPCB and the Shriram Labs — found pesticides. Soft drink companies are not meeting existing Indian standards. If a calculation is done to evolve a final product standard based on raw material norms of different countries, they are not meeting EU, USEPA or Australian standards either. They even exceed the relatively lax WHO drinking water guideline values in many cases. It is on this basis that we can say that the soft drinks are not safe.

2. *Safety is about managing the poison-nutrition trade-off*



To get nutrition, we eat food which has some amount of pesticides in it. This is why pesticides are known as 'economic toxins'. For example, if a pesticide is used to produce oranges, some amount of this pesticide will naturally get into the oranges and then into orange juice. Therefore, while one drinks the highly nutritive orange juice, one also has to ingest a small amount of the pesticide, which is safe because the nutrition provided by the orange juice overrides the ill-effects of that pesticide.

But if the food has no nutritive value and carries poisonous pesticides with it, consuming even the smallest possible amount would be unsafe because the body will

only get the poison and not its antidote, the nutrition. This is the whole logic behind pesticide health risk management.

3. *Safety is about ensuring that pesticides ingested through food are below the acceptable daily intake (ADI)*

Currently, the pesticide intake through an Indian diet exceeds the ADIs of the commonly used pesticides. There is, therefore, no space in our diet for pesticides from non-dietary food such as soft drinks. All kinds of food items have to be accounted for when calculating the ADI. Claiming that soft drinks are safe because they use a small percentage of the ADI is wrong, because if the ADI is already being exceeded, there is no space for non-nutritive, non-essential food in the diet.

The maze of meaningless regulation. The need for reform

What the JPC says:

"The Committee note with deep concern that the soft drink (carbonated water/sweetened aerated water) industry in India, with an annual turnover of Rs 6,000 crore is unregulated. It is exempted from industrial licensing under the Industries (Development and Regulation) Act, 1951 and gets a one-time license to operate from the Ministry of Food Processing Industries under the Fruit Products Order (FPO), 1955 and a no objection certificate from the local government and the State Pollution Control Board."

— Report of Joint Committee on Pesticide Residues in and Safety Standards for Soft Drinks, Fruit Juice and other Beverages, Chapter II, Conclusion/Recommendation 2.170

1. What were the standards for pesticide residues in soft drinks in India when CSE conducted its analysis?

There were no standards for pesticide residues in soft drinks in India when CSE conducted its analysis.

Rule 65 of the Prevention of Food Adulteration Act, 1954 (PFA) regulates pesticides in food. But food is defined to exclude 'beverages'.

Sub-section A.01-01 in Appendix B defines the standards of quality for non-alcoholic beverages — but has nothing to say about pesticide residues. This section defines carbonated water (soft drinks) as "potable water impregnated with carbon dioxide under pressure and may contain any of the following singly or in combination" (it then lists the various ingredients allowed under PFA).

Part II (D) of the Fruit Products Order (FPO), 1955 defines soft drinks as "sweetened aerated water with no fruit juice or fruit pulp or containing less than 10 per cent of fruit juice or fruit pulp". On the quality of the basic raw material it merely says: "water used in the manufacture shall be potable and if required by the licensing officer shall be got examined chemically and bacteriologically by any recognised laboratory. The manufacturer will bear the cost of such analysis".

The BIS 2346:992 standard for 'carbonated beverages' says in its 'foreword' that water is an ingredient in these beverages, but it does not set standards for pesticide residues in the water or the product.

The operative phrase is 'potable water'; the law says the soft drink industry must use 'potable water'. Unfortunately, there are no legal standards that define quality of drinking water in India (see chapter 9).

2. What did the government do to set standards after the release of the CSE study?

On August 26, 2003, a few days after it had agreed to set up a Joint Parliamentary Committee (JPC) to review standards, the Union ministry of health and family welfare issued a notification clubbing soft drinks and all other beverages (juices, tea and the ilk) in one category. It also notified that the bottled water standards — EU standards for pesticide residues in water — will be applicable for pesticide residues in water for all beverages.

3. What were the issues that confronted JPC on standard setting?

Since the government had already issued a draft notification on the standards which clubbed soft drinks and other beverages, the JPC had to consider the following issue:

A Should soft drinks and other beverages be clubbed together?

Another set of concomitant issues the committee had to grapple with in connection with a standard for soft drinks, given that these were products comprising 89 per cent water, 10 per cent sugar and 1 per cent others, were:

B What should be the standards for water used to make soft drinks?

C What provision should be made for pesticide residues in sugar in soft drinks?

D Should there be standards for the final product or only for raw material ingredients?



ISSUE A: Should soft drinks and other beverages be clubbed?

What the JPC says:

"The Committee is of the view that carbonated beverages cannot be clubbed with fruit juices, because they are different products with different specifications and the existing law already differentiates between these products. Moreover, the soft drinks do not form part of the nutritious diet, and though the present per-capita consumption of the soft drinks is not much in our country as compared to other countries like United States or European countries, but the trend towards more consumption is gradually growing in the entire Asian region and in future can expand to a significant extent in India also."

— Report of Joint Committee on Pesticide Residues in and Safety Standards for Soft Drinks, Fruit Juice and other Beverages, Chapter II, Conclusion/Recommendation 2.176

1. What is the politics of clubbing juices and soft drinks?

By clubbing together fruit juices and malt beverages (having significant proportions of different ingredients) with Coke and Pepsi products (that have sugar and water as their major ingredients) under one category, the regulation becomes

- impractical and unfeasible
- impossible to implement, and
- lax and weak.

Take the case of mercury standards. The mercury standard for water is 1 part per billion, while for fruit juices it is 1 part per million. In other words, it is 1,000 times higher. But if the two products were clubbed, the standard set would either be unfeasible for one category or lax for the other. Similarly, in barley and malt drinks, the bacterial plate count is kept at 5000/250 ml. But in water-based drinks, it should be 100/250 ml. If all drinks were clubbed under one category, what standards would be set for the bacterial plate count? The more stringent ones cannot be met by malt drink manufacturers, and the alternative would be ridiculously lax for products like soft drinks.

2. Why must the standards for pesticide residues distinguish between nutritive and non-nutritive, non-essential foods?

Eating 'safe' means calculating what we eat, how much we eat and how much pesticide can be allowed in what we eat. The food basket is also our pesticide basket. We have to ingest pesticides because we need nutrition, but we must not exceed our quota of pesticides that is allowed or acceptable. You can call this the nutrition-poison trade-off. So long as we cannot wish away pesticide use, it is imperative that this trade-off is a prudent one.

It will, therefore, come as no surprise that soft drinks are never included in global or national diet calculations. Soft drinks are non-essential, non-nutritive foods. Therefore, if any pesticide residues are allowed in a soft drink, the drink will have to be 'fitted in' into the calculation of how much residue we can safely ingest daily on the whole. In other words, some essential food item in our daily diet will have to make way for the non-essential soft drink. And we are not even talking about residues in water, because water is still not adjusted for in the daily diet. What would the soft drink companies want us to substitute soft drinks with? Milk? Apples? Fruit juices? Cereals?

Safety, therefore, is about setting and adhering to standards for pesticide residues in food products. If no standard has been set, then the product — soft drinks in this case — has no 'business' containing pesticide residues in it. It is unsafe and totally unacceptable.

Safety is not about playing the dumber number game. Tiny and continuous exposure to a cocktail — multiple residues — of pesticides in soft drinks would be deadly. Consider chlorpyrifos, a pesticide CSE detected in soft drinks. It can seep in through the barrier of the placenta; so, if pregnant women are exposed, even at low doses, it can damage the unborn. Now scientists are finding that infants are also more vulnerable — they produce less of the enzyme that helps to detoxify the body of this pesticide residue.

Can you still call these drinks safe? Only if you are acting — like Aamir Khan.



ISSUE B: Setting the standards for water used in soft drinks

What the JPC says:

“The committee are, therefore, of the considered opinion that the water used in the manufacturing of the soft drinks should be in conformity with the new norms which have already been notified under notification No. GSR 554 (E) dated 18.7.2003 so that the consumers are not deprived of the best standards. (These are standards set for pesticide residues in bottled water).

— Report of Joint Committee on Pesticide Residues in and Safety Standards for Soft Drinks, Fruit Juice and other Beverages, Chapter II, Conclusion/Recommendation 2.176

1. Why did this issue emerge?

Because soft drinks are products comprising 89 per cent water.

2. Why should India not accept the World Health Organization’s (WHO) guidelines for pesticide residues in water?

Firstly, it is important to note that the WHO has only laid down guidelines and not legal standards. It is for governments to stipulate the mandatory limits, based on their local and national environmental conditions. The guidelines are addressed to water and health regulators to “assist them in the development of national standards”.

Secondly, WHO has fixed guidelines for only a few pesticide residues in water. There are many pesticides in the WHO list which are not used in India; conversely, many pesticides that are used in India do not appear in the WHO list. Therefore, the WHO guidelines cannot be accepted as a legal standard in India, as they are not comprehensive enough to address the ground realities.

The WHO guidelines say that chemical contamination has no intended function in drinking water. It accepts that the term ‘tolerable daily intake’ (TDI) is more appropriate than ‘acceptable daily intake’ (ADI), as it signifies permissibility rather than acceptability.

Therefore, it becomes very important in terms of policy to distinguish between the pesticide regulations that exist for food and for water. The concept of ‘acceptable’ dose or ADI for pesticide residues in food has been accepted by the WHO and FAO as a necessary ‘evil’. On the other hand, in the case of drinking water, the concept of TDI is accepted because contamination in water is not acceptable, but tolerable at best. This is because pesticides have no reason to be present in water; they are contaminants. Thus, even if pesticides in food have to be accepted because of the nutrient-poison trade-off, they should not be accepted in water.

3. Is the EU standard for pesticide residues in water a “surrogate zero” and will it be impossible to adhere to?

The EU Drinking Water Directive (80/68/EC) sets the maximum permitted concentration of pesticide residues at 0.0001 mg/l for any individual compound, and a maximum total concentration of 0.0005 mg/l for any combination of substances. The limits were originally set at the threshold of the ability to detect pesticides in water — the lowest detection point. But since the 1980s, when this standard was first set, the limits have been considered and approved by panels of scientific experts from most member states. The result of this regulation has been to focus the attention of water companies and regulators on cleaning water and on preventing pesticides from reaching the water in the first place.

EU principles for establishing standards of water quality are based on the parametric values, in turn based on the scientific knowledge available; the precautionary principle has also been taken into account. These values ensure that water intended for human consumption can be consumed safely on a life-long basis, and thus represent a high level of health protection. The regulation on pesticide residues is a result of a cost-benefit analysis of who will pay for the clean-up. As municipalities, and in turn the consumers of water, have increasingly become responsible for paying for the treatment of water, it is they who have had the maximum interest in ensuring that contamination was kept to a minimum and therefore, the cost of clean-up was not passed on from the pesticide industry (the polluter) to the consumer (the victim).

4. But is this not a trade conspiracy by the EU to increase the cost of production in India? Can we afford these standards?

The more relevant question is whether we can afford to clean up after contamination has taken place. The greater the number of compounds used in the environment, the tougher it becomes to test water for all possible compounds it may contain. It is said that one tablespoon of spilled pesticide could pollute the water supply of 200,000 people for a day. We will need to regulate for all pesticides that are used, which increases the cost of regulation. Water treatment can be effective in removing pesticides from drinking water, but it has its costs. Therefore, the aim should be to implement precautionary measures and stringent standards to avoid contamination.

Pesticides contaminate water sources as run-off. Pesticides degrade in water — through light, hydrolysis and oxidation — but the breakdown compound may be more toxic than the original compound. Also, deprived of light and oxygen, pesticides take longer to break down in groundwater. Leaching of pesticides occurs when the substance moves into the soil in soluble form, usually with rainwater. Given that groundwater contains less organic matter — which would bind a pesticide — the poison remains chemically inert in the solution and produces a direct toxic effect. It is for this reason that pesticide residue standards for users of groundwater have to be stringent and health-based.

5. But can companies afford to treat the pesticides in water to meet these stringent levels?

This issue was also raised when the BIS and the Union ministry of health and family welfare revised their standards for pesticide residues in bottled water. The industry was up in arms, arguing that the new standards would be impossible to implement and that these would force it to close down. Nothing of the kind has happened. The government has notified the new (EU) standards for pesticide residues in bottled water as of January 1, 2004 and according to official sources, the cost to the companies to improve their water technologies has been affordable. BIS sources say that the inspection done for the 900-odd companies showed that they were meeting the new bottled water standards.

Similarly, the data provided by the two soft drink companies to the JPC shows that the cost of clean-up is very little. The data presented by Coca-Cola has been reproduced here. If this is assessed carefully, you will find that the water treatment technology used by Coca-Cola in India is very poor compared to that in Europe, where the company has to meet the EU drinking water norms (See table: *Types of water treatment systems used across Coca-Cola plants*). In the US and Canada, it pays for treated municipal water supply.

- While only 20 per cent plants in Europe have the coagulation system, about 73 per cent of the Indian plants operate with this conventional technology, incapable of dealing with high TDS or pesticide contamination
- 45 per cent of plants in Europe have RO-based systems; in India, only 27 per cent
- 34 per cent of the plants in Europe have membrane filtration technologies, which are sophisticated and expensive and are used also for high-end filtration of small amounts of toxins like pesticides. In India, not a single plant is equipped with membrane technology
- In other words, the water treatment technology used by Coca-Cola in Europe is far superior to what it uses in India. This is keeping in mind what Coca-Cola says — that “water in Europe is far more cleaner than in India”.

From a different perspective, Coca-Cola's claim that all 52 of its plants meet the pesticide residue standards in water (as per test reports done in Hyderabad-based laboratory VIMTA), is nothing less than amazing. If Coke is meeting these most stringent norms even with conventional technology, what is the problem for these companies in investing to clean up a little more?

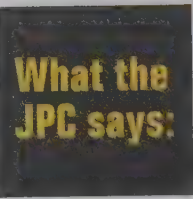
TYPES OF WATER TREATMENT SYSTEMS USED ACROSS COCA-COLA PLANTS

The technology they use in India is woeful

Division	Total no. of plants	No. of plants having coagulation system	No. of plants having RO system	No. of plants having RO + coagulation system	No. of plants having other water treatment systems*
USA	113	96 (85%)	5 (4%)	2 (2%)	10 (9%)
Canada	11	9 (82%)	0 (0%)	0 (0%)	2 (18%)
Europe	142	29 (20%)	36 (25%)	29 (20%)	48 (34%)
India	52	38 (73%)	12 (23%)	2 (4%)	0 (0%)

*Other water treatment systems are direct filtration, nanofiltration and microfiltration

ISSUE C: Setting the standards for pesticides in sugar



2.177: “Though it has been stated by some manufacturers of soft drinks that there is a possibility of pesticides entering into the beverages through sugar, the Committee are not inclined to accept the same and desire that this requires to be investigated in detail. The following may be considered while investigating:

According to the Package of Practices provided by Extension Departments, most of the sugarcane farmers are using only three to five types of pesticides...(most of which) are used at the time of pre-planting stage, planting stage and first six months of crop growth. In case there is any insect or disease attack on the crop, two or three types of pesticides are used till harvesting. This time gap between spray of pesticide and sugar extraction only results in degradation of pesticides. According to Current Science Vol 85, No 10, 25th Nov. 2003, under tropical conditions microbial activities in soil are high, hence degradation of pesticides is also faster. According to sugar technologists...sugar produced by crystalization is a process which itself ensures the purity of the product and reduces impurities like dust, dirt and pesticide residues. According to United States Department of Agriculture’s Pesticide Data Program (USDA-PDP) supplemented with information from Food and Drug Administration Centre for Food Safety and Applied Nutrition (FDA/CFSAN) on Organophosphorus Chemicals on Food Crops, “a knowledge of highly refined nature of sugar and syrups supported by the limited residues data mentioned above is the basis of assumption that negligible residues of pesticides would be expected to occur in sugar and syrups”.

2.178: This indicates that the number of pesticides present in carbonated water and the levels may not be from the sugar source.

2.179: Carbonated water manufacturers have already mentioned before JPC that they have foolproof process to select and treat the sugar and this treatment is uniform worldwide to ensure good quality sugar syrup for the products. These companies are already purifying the sugar syrup with Hot Carbon Treatment Process, which is effective in reducing most of the pesticide residues to below detectable level or below 0.1 ppb levels. The Committee feel that sugar, therefore, cannot be the only source of pesticide residues.

— Report of Joint Committee on Pesticide Residues in and Safety Standards for Soft Drinks, Fruit Juice and other Beverages, Chapter II, Conclusions/Recommendations 2.177-2.179

1. Why did this issue emerge?

Because after water, sugar is the primary ingredient, comprising 10 per cent of the product.

2. What are the maximum residue levels (MRLs) of pesticides allowed in sugar in (a) India and (b) other parts of the world?

- Codex — the global standard setting body of FAO/WHO — has set MRLs for seven pesticides in sugarcane.
- In India, under the PFA, MRLs have been set for four pesticides in sugarcane.
- The Central Insecticides Board (CIB) has recommended 13 pesticides for use in sugarcane. Of these 13, MRLs have been set for just two. The pesticides for which MRLs have been set under PFA, are not in fact in the recommended list of CIB.

SWEET NORMS?

Saving grace for consumers?

Crop	Pesticide	MRL: Mg/kg
Sugarcane	Atrazine	0.25
	Carbofuran	0.10
	Phorate	0.05
	Simazine	0.25
Sugarbeet	Chlordane	0.3
	Monocrothphos	0.05
	Trichlorfon	0.05
	Thiometon	0.05
	Carbendazim	0.10
	Benomyl	0.10

Consider the standards set under PFA for pesticides in sugarcane and sugarbeet (see table: Sweet norms?). It is important to note that even though India does not grow sugarbeet, more pesticide MRLs have been set for this crop, which would give an advantage to the growers of sugarbeet, for if in imports these pesticide residues were to be found, they would be legal.

3. If a pesticide residue for which there is no MRL is detected on a crop, would that be termed as ‘adulterated’ or ‘violating the provisions of the PFA Act’?

According to the PFA Act (Part 65):

- No insecticide shall be used directly on articles of food
- The amount of insecticides on the crop cannot exceed what has been

prescribed under the Act. This also logically means that if an insecticide is not prescribed under the Act for the particular crop, it cannot be used. Or if it is used, and its residues detected, then it would be in violation of the law.

- The amount of insecticides on food cannot exceed the tolerance limit.

4. Can a pesticide standard set for sugarcane be 'carried over' to the processed sugar commodity? In other words, will refined sugar be allowed the pesticide residues which have been allowed in raw sugarcane or sugarbeet?

There is a difference between global practice and Indian law on this issue.

Generally, across the world, the pesticide standard set for the raw agricultural commodity applies to the processed commodity as well. For instance, the Codex standard on sugar (CODEX STAN 212-1999 (Amd. 1-2001)) states that: "The products covered by this standard shall comply with those maximum residue limits established by the Codex Alimentarius Commission for these commodities". Therefore, according to Codex, sugar has to meet the pesticide MRLs listed for sugarcane or sugarbeet.

But the PFA in India sets different conditions: PFA regulates the quality of final product in Appendix B. The law says that contaminants (pesticides) from raw material cannot be carried forward to the final product.

- Part XI A (Crop contaminants): defines pesticides as contaminants.
- Part XIII A (Carry-over of food additives): categorically states that contaminants cannot be carried over from raw material to final product. "For the purpose of the standards specified in Appendix-B (definitions and standards of quality: finished products), the carry-over principle applies to the presence of additives such as colours, flavouring agents, antioxidants, anti-caking agents, emulsifying and stabilising agents and preservatives in food, as a result of the use of raw material or other ingredients in which these additives were used. *The presence of contaminants is not covered by this purpose* (emphasis added)."

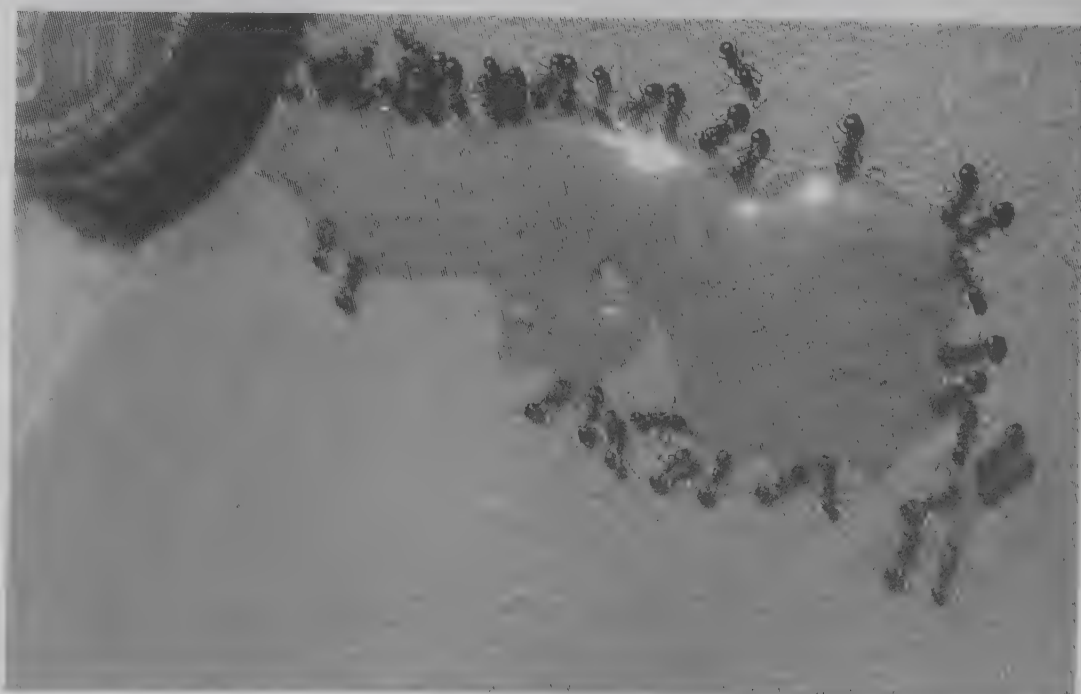
The PFA Act also makes it clear that all MRLs for pesticides have been set for raw agricultural products moving in commerce.

In other words, if there are contaminants in any raw material (say sugar), manufacturers have to clean it up in the final product. Therefore, the Indian law puts the onus on the manufacturers and not the farmers to clean up the product.

5. Is it possible to remove pesticide residues from the sugar used to manufacture soft drinks?

The data presented by the companies to the JPC reveals that they have the technology to clean sugar of the pesticide residues. Coca Cola told the JPC that it used a technology — the hot carbon treatment process — to significantly reduce pesticide residues. It also presented data showing how its technology cleaned pesticides from the raw sugar to the sugar syrup it used for manufacturing its product.

Therefore, again like water, the manufacturers possess the technology to clean up pesticides in sugar. Furthermore, Indian law makes them responsible for cleaning the pesticides in the final product.



ISSUE D: Setting final product standards for soft drinks

What the JPC says:

"The Committee...recommend that India should formulate its own food standards, which are based on scientific criteria, protect the interest and health of its people, and are in keeping with the internationally acceptable norms. The Committee...recommend that standards for carbonated beverages, which are best suited for Indian conditions, need to be fixed in the overall perspective of public health. These standards should also be stringent enough. The reason that the other countries have not fixed such limits, should not dissuade our lawmakers in attempting to do so, particularly when a vulnerable section of our population who are young and constitute a vast national asset are consuming the soft drinks. In the Committee's view therefore, it is prudent to seek complete freedom from pesticide residues in sweetened aerated waters. 'Unsafe even if trace' should be the eventual goal."

— Report of Joint Committee on Pesticide Residues in and Safety Standards for Soft Drinks, Fruit Juice and other Beverages, Chapter II, Conclusion/Recommendation 2.181

1. Why should India set final product standards for pesticide residues in soft drinks when the world does not?

Many countries, including India, have standards for pesticide residues in finished processed foods. Processed food items such as butter, *ghee* and cheese in India are regulated for pesticide residues in the final product under PFA. Many countries also have pesticide residue standards for multiple-ingredient processed, cereal-based foods and infant food (see box: *Pesticide standards for processed baby food*).

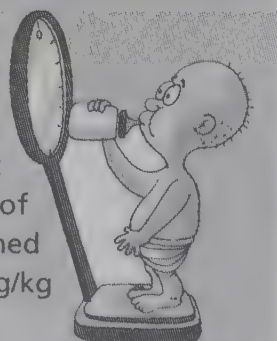
But as the industrialised world has more or less cleaned its agricultural raw material of pesticide residues, it does not see the need to set final product standards for its processed food industry. In other words, they do not need to set standards for many processed foods like soft drinks, simply because they do not have a problem of pesticide residues in their raw commodities.

This, however, is not the case in India. Our standards for residues allowed in our raw agricultural produce are high. Even then, according to the government's own data, on an average, 20 per cent of the food tested has been found to be above the standards. Therefore, we are likely to have high pesticide levels in our processed food commodities, as has been found by government agencies (monitoring reports of the All India Coordinated Research Project on Pesticide Residues under the Indian Agricultural Research Institute) for processed food commodities such as baby milk powder (See box: *Indian honey...jam...jelly...contaminated, says government report*). We will, therefore, have to set pesticide standards for finished processed products.

PESTICIDE STANDARDS FOR PROCESSED BABY FOOD

Countries have set standards for pesticide residues in processed cereal-based foods and baby foods for infants and young children. This is because there are doubts on the adequacy of the existing acceptable daily intake (ADI) values for the protection of infants and the young. The European Union (EU), for instance, has decided that as scientific evidence is insufficient to protect children, it will use the precautionary principle to adopt separate pesticide residue standards for processed foods.

In 2001, pesticide residues standards in processed cereal-based foods and baby foods was set by EU at a maximum residue limit of 0.01 mg/kg for any individual pesticide, pending the establishment of specific maximum limits acceptable for the health protection of infants and young children. In addition, the directive banned the presence of pesticides that have an ADI of 0.0005 mg/kg bodyweight or lower.



2. How are pesticide residue standards for multi-constituent products (containing more than one ingredient) set?

- The principle governing the establishment of standards for composite processed food (food containing more than one agricultural commodity) is that the standard is the sum of the MRLs of the commodities as proportionately present
- Therefore, in case of soft drinks, take water (89 per cent of the product) and sugar (10 per cent of the product) standards and calculate the finished product standard. But as there is no

INDIAN HONEY, JAM, JELLY...CONTAMINATED, SAYS GOVERNMENT REPORT

The All India Coordinated Research Project on Pesticides Residues (AICRPPR), under the Union ministry of agriculture, analyses commodities and products for contamination. Its 2001 data shows:

- Thirteen centres analysed 82 honey samples. While the Hyderabad, Rahuri, Solan and Vallayani centres found the honey to be free from pesticides, Kalyani, Jaipur and Kanpur reported 100 per cent contamination with residues of HCH, endosulfan, DDT, chlorthalonil and cypermethrin. Of the 82 samples of honey, 51 per cent had pesticide residues.
- Processed food samples were monitored by some of the centres. Sixty-seven per cent of the samples of fruit jam analysed by three centres — Jabalpur, Jaipur and Rahuri — were found to be contaminated with residues of endosulfan, malathion and HCH.
- All the 12 samples of jelly analysed by the Kalyani, Jabalpur and Jaipur centres were contaminated with residues of HCH, DDT, endosulfan and fenvalerate.
- Twenty per cent of the 20 tomato sauce samples analysed by the Anand, Hyderabad, Jabalpur, Ludhiana, Rahuri, Solan and Vellyani centres contained HCH, malathion, chlorpyrifos, cypermethrin and DDE.

DIFFERENTIATING BETWEEN THE READY-TO-EAT AND NOT-READY-TO-EAT

The USEPA has reviewed the definition of the term 'ready-to-eat' food. Before the mid-1990s, the agency defined all food available for sale as being ready-to-eat. But in response to a petition by the National Food Processors Association, it decided that ready-to-eat food has a commonsense meaning of food which is consumed without further preparation, or is consumed 'as is', and changed its interpretation accordingly. It began to differentiate between processed foods like mint oil, citrus oil, guar gum and dried tea as not-ready-to-eat, as against raisins, olives and potato chips, categorised ready-to-eat.

In the ready-to-eat category, the agency decided that if the processed food was found near or above the standards set for the raw commodity, then separate tolerance levels (MRLs) would be set for this specific commodity.

For processed foods that are not ready to eat, firstly the residues in the ready-to-eat form of that commodity would have to be determined. If these are found within tolerance limits, then an MRL would be set on the not-ready-to-eat commodity only to match the raw commodity. But if the residues in the prepared food are higher than the tolerance set for the raw commodity, a separate MRL would be established for the processed commodity.

standard for sugar for the pesticides found, the product will have to meet the water standard at the very minimum.

In 1995, the US Environment Protection Authority (USEPA) developed guidelines for estimating pesticide residues in processed food and feed. (see box: *Differentiating between the ready-to-eat and not-ready-to-eat*)

3. Are there any final product standards anywhere in the world for pesticide residues in soft drinks?

No. For the reasons mentioned above, no standards exist for pesticide residues in the final soft drink.

4. How will India set final product standards for pesticide residues in soft drinks, when the rest of the world has not?

As there is no MRL — standard — for sugarcane (hence sugar) for DDT, lindane, chlorpyrifos or malathion in either the PFA Act, 1954, or the EU, USEPA and CODEX standards, there can be no acceptable limit for these pesticides in sugar. Therefore, there will be no allowance for 9 per cent of the sugar MRL.

Similarly, there is no information about what constitutes 1 per cent of the soft drink and no MRL can be accepted. The MRL will therefore be set as 89 per cent of the water standard.

The MRL for the finished product would be:

$$= (9 \text{ per cent of sugar MRL}) + (1 \text{ per cent of other MRL}) + (89 \text{ per cent of water MRL})$$

$$= 0 + 0 + 89 \text{ per cent of water MRL} = 89 \text{ per cent of water MRL}$$

In order words, the MRL of the finished soft drink would be 11 per cent less than the MRL set for water, or even more stringent than the water MRL.

SETTING FINISHED PRODUCTS NORMS FOR SOFT DRINKS

MRL of a finished product with multiple commodities = Sum of MRLs of various commodities as proportionately present.

In the case of soft drinks the constituents, according to the manufacturers, are:

Minimum of 9 per cent sugar + 89 per cent water + 1 per cent others.

Therefore, to set the pesticide standard for the finished product (ready-to-drink), you will calculate:

(9 per cent of sugar MRL) + (1 per cent of other MRL) + (89 per cent of water MRL)

5. Without a final product standard, how will the government regulate the quality of the product?

We must realise that the Indian PFA Act 1954 mandates the quality of the final product which is sold and consumed.

- Under the PFA Act Appendix B:A.01.01, “carbonated water means potable water impregnated with carbon dioxide and may contain...”. But what was missing was the definition of the quality of the “potable water” to be used.
- The Union ministry of health and family welfare notification now lays down that the quality of the water to be used in soft drinks should meet the bottled water standards.
- Final product specifications, therefore, are now complete.

Without this, it would mean that inspectors would be required only to test the quality of the water being used for the manufacture of soft drinks and not the quality of the final produce. This simply means that the government is not willing to regulate this industry and believes that its claims of purity and self-regulation are correct. In other words, Aamir Khan — the actor who certifies in paid advertisements that Coke is clean — and not the government, needs to be believed.

6. If the CSE or any government study is correct, are soft drinks adulterated?

Adulteration is defined under the Prevention of Food Adulteration (PFA) Act 1954 as not meeting the prescribed standards. Under the PFA, there is a final standard for soft drinks (carbonated water), but it does not specifically mention the quantum of pesticide residues permitted in the final product. One view could be therefore, that as no pesticide residue norm has been set for the final product under the legislation, no pesticides are permitted. The Union ministry of health and family welfare has said in its reply to the JPC that in Japanese regulations, “the requirements of pesticide residues in carbonated beverages has not been prescribed, which means that these products should be free from pesticide residues because these are not agricultural produce and hence there is no likelihood that pesticide residues will be present in these products.”

On the other hand, it could be argued that as the standards for pesticide residues in water was not set, the final product, if contaminated was not in breach of the standard. However, now that the government has set the input standards for water that are used to manufacture soft drinks, it can be assumed that any product which exceeds the set water standard for pesticide residues, will be termed as ‘adulterated’.

By this estimation all the samples tested by CFL, CFTRI and CPCB, which found pesticides in quantities which were higher than set water standards, will be termed as adulterated and the provisions of the PFA will apply. Therefore, it would be correct to say that the products tested were unsafe.

7. Should there be no standards for pesticide residues in juices?

Of course there should be standards set for pesticide residues in juices and in other processed foods as well. Until we can ensure that our agricultural raw material, used to manufacture processed food, is within the set standards, we will have to bear a double burden in setting and enforcing standards for processed foods like juices and jams.

However, fruit juices and other foods which are included in essential diet calculations, will have different standards for pesticide residues as compared to food which is non-nutritive and non-essential (like soft drinks). Fruits are included in the food basket and therefore, their pesticide residues are part of the nutrition-poison tradeoff. But what we need is reform in our food safety standards. It is clear that as yet, the standards set for pesticide residues in all our food are too high and worse, even these standards are exceeded because of poor enforcement.

It is critical that we clean up our act. Fast.

What government has done to set standards post-JPC

1. Who is responsible for setting standards for soft drinks?

There are two parallel processes within the government. One is controlled by the Union ministry of health and family welfare, which has to set standards under the Prevention of Food Adulteration Act, 1954 (PFA). In this process, the Central Committee on Food Standards (CCFS), a statutory body under the ministry, has to formulate the standards and forward it to the Directorate General of Health Services for consideration and inclusion in the PFA. These are mandatory standards and are implemented by the food and drug departments of the state governments.

On the other hand, the Bureau of Indian Standards (BIS) — which is the premier standard setting institution in the country — is an autonomous body working under the Union ministry of consumer affairs. BIS makes voluntary standards for various products, which are sold with ISI mark. BIS standards are therefore more stringent than the PFA standards. However, for many products — critical from the public health and safety point of view — the BIS standards are made mandatory standards and included under the PFA. But such mandatory standards that BIS makes are enforced by the BIS itself, so that it is considered to have a much more comprehensive regulatory system, than the departments under the ministry health of the state governments.

2. What has BIS done?

After the release of the CSE study on soft drinks, BIS — which till then had a standard for soft drinks that was voluntary in nature and not mandatory — started to revise its existing soft drink standards. It constituted a 39-odd member committee comprising of industry (including the representatives of Coca Cola and PepsiCo), NGOs (including CSE), government scientists and consumer groups to deliberate and set new BIS standards for soft drinks. After a deliberation process that lasted for more than a year the BIS released its draft standard of soft drinks on July 15, 2004.

The Draft Indian Standard, Ready-To-Serve Non-Alcoholic Beverages — Specification, DOC: FAD 14 (1552)C; see annexure for full text of the draft — is the first-ever attempt in the world to set pesticide standards for soft drinks. It has also set norms for pH and caffeine content in these drinks, imposing strict labelling requirements. The standards are, at present, open for public comments for 45 days till August 31, 2004, after which they will be finalised as BIS standards for soft drinks (see annexure for standard).

The BIS standards are in keeping with the recommendations of the Joint Parliamentary Committee (JPC) on pesticide residues in soft drinks. The draft standards set limits for 16 pesticides in the finished product of soft drinks. The limit for individual pesticide residue has been fixed at 0.0001 milligramme per litre (mg/l), but the total pesticide residue is not to exceed 0.0005 mg/l.

Also, the pH of carbonated beverages has to be not less than 2.3.

Besides, the amount of caffeine permitted in soft drinks has been reduced from 200 mg/l to 145 mg/l. Manufacturers will have to follow labelling requirements. For instance, if the caffeine content in these beverages is more than 145 mg/l, the exact amount has to be indicated on the label, which should also specify that the drink “is not recommended for children, pregnant or lactating women, and individuals sensitive to caffeine.”

3. Who was on the committee of BIS, which set these standards?

The BIS committee on carbonated beverages included representatives from the soft drink industry and industry associations, consumer and environmental groups and leading agricultural scientists, nutritionists and toxicologists that had worked for the past nine months to formulate the standard. Coca-Cola India was a full member of the committee, while PepsiCo attended all the meetings of the committee as a representative of the industry association, CIFTI.



4. What has the Union ministry of health and family welfare done?



Meanwhile, after the release of the JPC report indicting the Cola companies and asking government to set strict norms for pesticides and other contaminants in soft drinks, the Union ministry of health and family welfare convened an emergency meeting of the CCFS on February 13, 2004 to discuss the JPC report. The committee endorsed the report. It recommended that the water that would be used to manufacture the drinks should conform to the standards already stipulated for packaged drinking water. But on the issue of setting standards for the final product, the committee said that it would invite suggestions from various stakeholders and would then finalise its recommendations. It handed over deliberations on this issue to the Pesticide Residues Sub-Committee of the CCFS and asked it to report back with recommendations. It did not address the issue of caffeine content in soft drinks or pH of soft drinks in the meeting.

However, when the Pesticide Residues Sub-Committee met in late June, 2004 to finalise the standards, the sub-committee seemed to suggest the need to delay the process even further. This sub-committee decided to recommend that there should be a year-long nation-wide monitoring of soft drinks for pesticide residues. Worse still, the sub-committee recommended setting up of another expert group to work out the modalities of the monitoring exercise.

Then on July 27, 2004, the Union ministry of health and family welfare issued a notification specifying that the quality of water, which would be used in the manufacture of soft drinks, had to meet the bottle water standards, already in force since January 1, 2004.

5. What is the difference between the standards set by BIS and the standards set by the Union ministry of health and family welfare?

The standards set by the Union ministry of health and family welfare are limited to the raw water used in the manufacture of the soft drinks. However, this leaves open the issue of how the inspector will enforce the norms as the ministry has not clearly specified the quantum of pesticides which is to be allowed in the product.

On the other hand, the BIS draft standards stipulate the pesticide residues that are permitted in the final product. This will make the enforcement of standards possible.

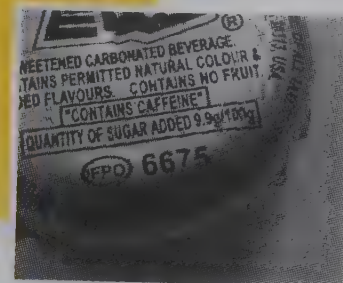
The draft BIS standards also differ from the ministry's recommended standards in August 2003 in which the government had clubbed carbonated beverages to include fruit juices. The BIS draft is limited to the category of products, which are non-alcoholic carbonated beverages that use less than 10 per cent fruit pulp.

But the fact remains that the BIS has also taken a great leap forward towards bringing into reality the vision of public health and food safety the JPC had set out in its report. The question is: will it have the courage to continue on the path it has decided to jump onto?

4

It isn't just sugar

Caffeine and other soft drink ingredients are harmful. How does the world regulate them?



What the JPC says:

"The Committee find that soft drink companies are selling non-caffeinated soft drinks in every country besides the caffeinated ones, including the United States and all countries in Europe. In India, their production of non-caffeinated soft drinks is very little, as only Limca, Sprite and Mazza are stated to be non-caffeinated. Though the soft drink manufacturers have contended that more non-caffeinated products can be made available in India also provided there is a demand from the consumers, the Committee desire that at least option should be made available to the consumers to choose between the two. It is therefore desirable that all brands should include caffeinated and non-caffeinated drinks. They also desire that there should be no difference in the quality of products being marketed in India as compared to those which are being sold in the USA or other European countries.

"The Committee have been informed that Drink and Carbonated Beverages Sectional Committee FAD 14 which is the BIS Technical Committee have decided to revise IS 2346-1992, which are standards for carbonated beverages and make it more broad based. In their report, the Technical Committee has advocated for restricting the use of caffeine in carbonated beverages as has already been done by some countries like Australia and China. They have also desired that the label on the caffeinated beverage must include advisory statements to the effect that the beverage contains caffeine and the same is not recommended for children, pregnant or lactating women and individuals sensitive to caffeine. The Committee desire that this recommendation be implemented based on best practices globally regarding caffeine regulations and its effects on human health. However, the Ministry may consider bringing down the present limit of 200 ppm in carbonated beverages as prescribed under PFA."

— Report of Joint Committee on Pesticide Residues in and Safety Standards for Soft Drinks, Fruit Juice and other Beverages, Chapter II, Conclusions/Recommendations 2.185-2.186

A. Consider caffeine

1. Why does caffeine need to be regulated? What are its health impacts?

It is now well understood that large quantities of caffeine, when consumed, can cause insomnia, nervousness, anxiety, irritability and fluctuating heart rate. A major concern about caffeine is that it increases the excretion of calcium in urine, which in its turn enhances the risk of osteoporosis. Some epidemiological studies correlate exposure to caffeine during pregnancy to the occurrence of congenital malformations, foetal growth retardation, miscarriages (spontaneous abortions), behavioural effects and maternal fertility problems.

In fact, in 1981, the US Food and Drug Administration (USFDA) had issued an advisory warning that "Pregnant women should avoid caffeine-containing foods and drugs, if possible, or consume them only sparingly." The USFDA still maintains that advisory as its official policy.

A new medical term — 'caffeinism' — has been coined to describe the health impacts due to high intake of caffeine: this is a combination of agitation, disorientation, nervousness, twitching, recurrent headaches and gastrointestinal disturbances.

In 2001, the Australia New Zealand Food Authority (ANZFA) revised its standards for caffeine in soft

drinks and carbonated beverages, keeping in mind the following “inherently cautious principles” to be used as a basis for regulatory decisions regarding caffeine:

- Where there is an uncertainty about the potential for adverse health effects, particularly in children, a cautious approach should be taken regarding the broadening of any permission to add caffeine to food
- When caffeine is added to a food other than one in which it occurs naturally, its presence, regardless of the source, should be identified on the label and, if appropriate, the approximate quantity in the product stated
- Where caffeine is added to a food for its stimulant effect (that is, at levels greater than necessary for flavouring), mandatory advisory statements that are additional to those applying to general foods would normally be required

2. There is more caffeine in coffee and tea; why regulate caffeine in soft drinks?

Natural caffeine found in coffee and tea is not regulated anywhere in the world. Only artificial caffeine — introduced into products — is regulated. Therefore, one cannot compare soft drinks with tea or coffee. There is a distinction between formulated caffeinated beverages and natural caffeine-containing beverages.

In fact, the USFDA began regulating caffeine content in colas when it learnt that processing of kola nuts robbed them of their natural caffeine. That is why companies buy formulated caffeine to put into their drinks. This becomes important particularly because children drink soft drinks, even if they are stopped from drinking tea or coffee.

A more relevant question to ask would be: If caffeine was no cause for concern, why did these companies introduce de-caffeinated versions of their drinks in most industrialised countries?

3. Is caffeine globally regulated?

Yes. Regulators are now differentiating between the use of caffeine as a flavouring agent (mainly in brown-coloured cola drinks) and as an addicting or stimulating agent (used in other drinks). Companies argue that use of caffeine as a flavouring agent is necessary. However, a 2000 study by Johns Hopkins Institute, USA on caffeine in soft drinks found that people couldn't taste the difference between caffeine-containing and caffeine-free cola until the caffeine levels were raised much beyond those approved by the USFDA. In the EU, any artificial caffeinated drink containing more than 150 mg/l caffeine is, by law, termed a high caffeine drink and mandatory warnings are put on the label.

There are two broad practices related to caffeine in the world:

- The first is of those countries that have recently reviewed the issue of caffeine in soft drinks. *These countries have allowed caffeine only in 'cola drinks' and at a level not more than 150 mg/l.* Notable among these are China, Japan, South Africa, the Netherlands and Spain.
- The second is of those countries that allow caffeine at a level not exceeding 200 mg/l, but

have a strong programme to advise people on the health impacts of caffeine intake. As a result, companies provide non-caffeinated soft drinks in these countries. For instance, there are non-caffeinated versions of cola and non-cola drinks, such as PepsiCo's Mountain Dew, in the US.

4. How does Indian law regulate caffeine?

Under the Prevention of Food Adulteration Act (PFA), 1954 caffeine is permitted up to 200 mg/kg in carbonated water (soft drinks). The PFA Act does not distinguish between the different types of soft drinks such as colas or carbonated citrus-based drinks. Therefore, currently, caffeine content of up to 200 mg/kg is allowed in all soft drinks in India. The result is that today companies are putting caffeine in non-cola drinks



AUSTRALIA'S CAFFEINE STANDARD

The Australian standard on caffeine states the following:
“Caffeine to be added only in cola drinks to a maximum level of 145 mg/l. If the caffeine content exceeds 145 mg/l (allowed in some energy drinks), the label on the package must include advisory statements to the effect that:
(a) The beverage contains caffeine; and
(b) The beverage is not recommended for —
 (i) Children; and
 (ii) Pregnant or lactating women; and
 (iii) Individuals sensitive to caffeine.
(c) The label on a package of formulated caffeinated beverage must include an advisory statement to the effect that ‘Consume no more than [amount of one-day quantity (as cans, bottles or ml)] per day’.

A FLAVOUR OF RISK

Caffeine in soft drinks has been linked to high blood pressure.

For adolescents, caffeine intake through soft drinks may increase blood pressure and thereby augment the risk of hypertension. So concludes a study, 'Association of Caffeinated Beverages with Blood Pressure in Adolescents', published in the *Archives of Paediatric and Adolescent Medicine* (Vol 158, No 158, May 2004).

Researchers from the department of paediatrics, Medical College of Georgia, USA, conducted the research. As per their findings, African Americans consuming more than 100 milligrammes per day (mg/d) of caffeine through beverages (soft drinks) have higher blood pressure than groups consuming less than 100 mg/d of caffeine. "The sugar content of soft drinks and its contribution to the world's obesity problem has received much attention. But little research has been conducted to look at the effects of caffeine content," asserts Margaret R Savosa, one of the researchers.

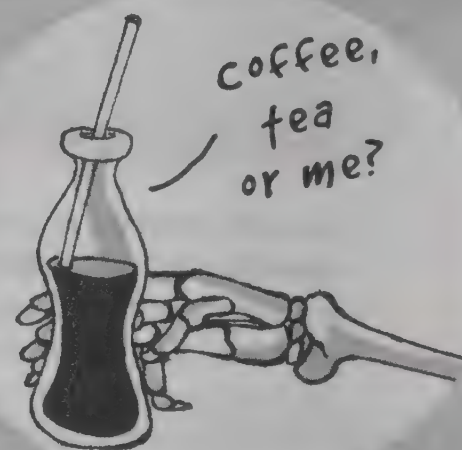
Worldwide, 68 per cent of boys and 62 per cent of girls aged 12 to 17 drink one or more soft drinks daily. Moreover, the percentage of adolescents drinking caffeinated soft drinks is more than double the percentage of those who consume non-caffeinated soft drinks. Caffeine is a drug used in soft drinks as a "flavouring agent". In the past, caffeine intake has been linked with a number of diseases, like recurrent headaches.

Yet another impact

The study's objective was to assess the association between consumption of caffeinated beverages and blood pressure in African American and white adolescents. The sample consisted of African American boys and girls, and white boys and girls, all aged 16. The participants were stratified into three caffeine-intake categories — 0-50 mg/d, >50-100 mg/d and >100 mg/d.

The results were found to be quite disturbing. There was a clear link between caffeine intake and high blood pressure among African American participants. Such a correlation, however, could not be found among the White population, probably due to genetic factors.

According to the researchers, additional research should be conducted owing to rising rates of adolescent hypertension and soft drink consumption. Agrees Stephen R Daniels of the US-based Cincinnati Children's Hospital Medical Centre. "There is still a lot to learn about diet and blood pressure, especially in children and adolescents.... It appears that caffeine could be important, but we need to know more about what it does over a prolonged time period," he says.



as well. For example, Mountain Dew, a new non-cola product launched by PepsiCo in India, has one of the highest caffeine contents — even more than cola drinks manufactured by the companies. But unlike in the US or Canada, there is no health advisory on caffeine in India. Nor do Indian regulators demand non-caffeinated versions of the caffeinated drinks.

India's labelling requirement for caffeine is poor. It does not insist on any advisory on the package for caffeine content beyond a certain level. Companies have to only write "Contains caffeine" on the package, which they do in miniscule and unreadable font sizes.

Coca-Cola and PepsiCo, the two global giants of the soft drink industry, are meeting different caffeine standards in different countries for the so-called same reason — providing 'flavour'. If Mountain Dew, for instance, is sold in Australia without the introduction of formulated caffeine in it, why is there a need to introduce caffeine in the Indian product? Is it that because of our weak regulations, the companies can walk away with anything?

Considering that children are a primary target group for soft drink companies and they form a major chunk of consumers of their products, it would be important to follow the global best practice in this regard.

5. What do the companies say?

In its reply to JPC on why it was supplying non-caffeinated drinks in the US and not in India, Coca-Cola said, "The company conducts market research to find out the preference and needs of the consumers and develops products to suit consumer needs.... if consumers in India show a significant interest in caffeine-free cola products, then these products will be offered in India.

PepsiCo provided a similar reply.

OTHER HARMFUL EFFECTS OF SOFT DRINKS

The main health impact of soft drinks lies in their complete lack of nutrition. Soft drinks displace milk in the diet, eliminating a major source of bone-building calcium. There is enough evidence about this in the world.

The World Health Organization (WHO) finds that as yet, the incidence of osteoporosis is many times higher in affluent developed countries than in developing countries; but it expects to see a four-fold increase in hip fractures by 2050 because of the globalisation of diets and lifestyles. In 2003, the WHO had published its report on diet, nutrition and the prevention of chronic diseases, in which it projected that by 2020, chronic diseases will account for three-fourths of all deaths worldwide and that 71 per cent of deaths due to ischaemic heart disease; 75 per cent of deaths due to stroke, and 70 per cent of deaths due to diabetes will occur in developing countries. The number of people with diabetes in the developing world will increase more than 2.5 fold — from 84 million in 1995 to 228 million in 2025. On a global basis, 60 per cent of the burden of chronic diseases will occur in the developing world.

In this report, the WHO has clearly stated that “diet has been known for many years to play a key role as a risk factor for chronic diseases”.

It goes on to examine many food and lifestyle changes, one of which is the high intake of sugar-sweetened beverages, which it calls a causative factor for the increasing incidence of chronic diseases: “The high and increasing consumption of sugar-sweetened drinks by children in many countries is of serious concern. It has been estimated that each additional can or glass of sugar-sweetened drink that they consume every day increases the risk of becoming obese by 60 per cent.”

B. What about pH?

The pH (acidity) of various fruits and vegetables are similar to that of soft drinks. Why then should pH of soft drinks be regulated?

From dental caries to acidity, soft drinks have been indicted in many accounts for a number of health disorders — mainly because their manufacturers keep the pH of their products low, resulting in their high

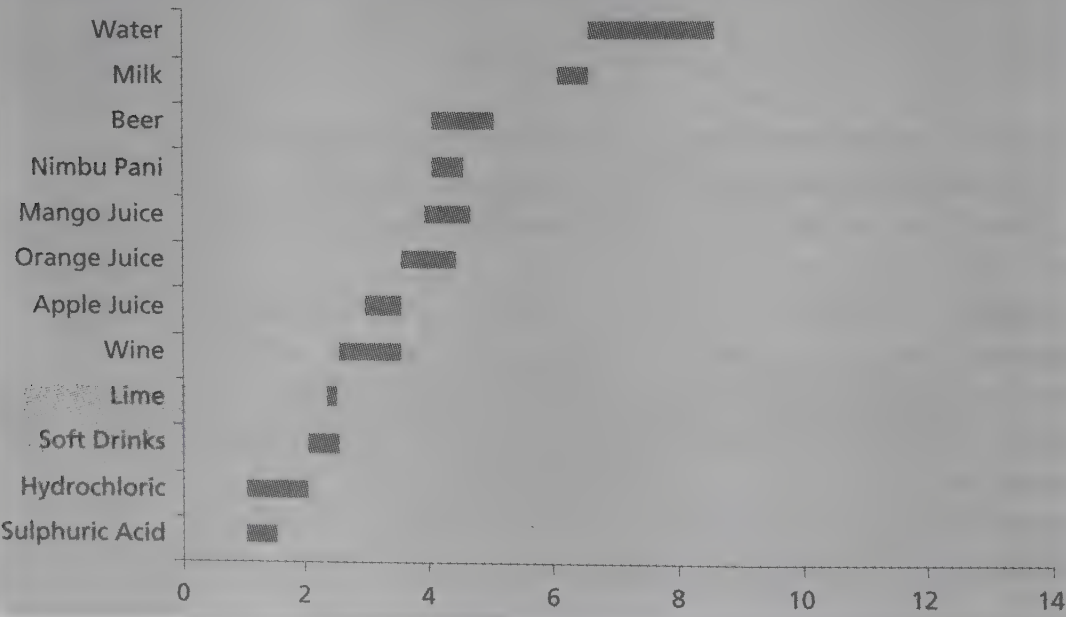
acidic levels. It is important to note that companies have an interest in keeping the pH low as it gives a longer shelf life to the product and, therefore, increases profitability.

The pH of fruits and vegetables, according to company data itself, is not the same as that of soft drinks. Only lemon has a similar pH and nobody drinks one bottle of concentrated lemon juice at a time.

South Africa is the only country which regulates pH at 2.5 for soft drinks. According to the draft Indian standards for carbonated beverages, formulated by the Bureau of Indian Standards (BIS), pH in soft drinks in India should be not less than 2.3.

DOES ANYBODY DRINK A LITRE OF LEMON?

Among fruits and vegetables, only lemon has a pH similar to soft drinks



5

Fat-free choice?

The World Health Organization presented a Global Strategy on Diet, Physical Activity and Health at the World Health Assembly in May 2004.

It wanted to combat a global epidemic called obesity, and the diseases that result from it. But at the Assembly, it was corporate mulishness that ruled

1. What is the WHO so worried about?

Obesity and its related diseases have become a worldwide health concern. Going by the World Health Organization's (WHO) definition of obese (body mass index or BMI of at least 30 kg/m²) and overweight (BMI of at least 25 kg/m²), around one billion adults in the world are overweight and around 300 million of them are obese.

Diabetes, hypertension, cardiovascular diseases, gallbladder ailments, cancer, psycho-social problems, breathlessness, sleep disorders, asthma, arthritis, weak bones and reproductive hormone abnormalities are just some of the ailments more likely to affect obese and overweight people. WHO's surveillance of risk factors (SURF) report, which came out in 2003, says diet, lack of physical activity and obesity are common risk factors for non-communicable diseases (NCDs). The *World Health Report 2003* says that in all continents except Africa, more people die of NCDs than communicable diseases; by 2020, 73 per cent of all deaths will be caused by NCDs.

Both developed and developing nations are equally afflicted. Of the 16.6 million people who died of cardiovascular diseases (CVDs) all around the world in 2001, around 80 per cent were from low- and middle-income countries. India, China, Indonesia, Pakistan and Brazil are among the top 10 countries affected by diabetes. The number of people who die due to diseases linked to obesity has doubled in Canada in 15 years. Approximately 2,79,000 people died in the European Union (EU) in 1997 due to problems caused by excess weight and obesity, says a study done by the department of preventive medicine and public health, School of Medicine, Universidad Autónoma de Madrid, Madrid. In the US, obesity has doubled in the last 20 years and now affects one in three adults. It is one of the key causes for a 50 per cent increase in disability rates in the US in the last two decades, says the RAND Corporation, a think tank and research group. In fact, a 2004 study by the Centers for Disease Control and Prevention says obesity and inactivity could soon overtake tobacco as the leading cause of preventable deaths in the US.

Expectedly, this massive obesity epidemic is eating up the money countries spend on healthcare, and is also wasting their human resources.

2. How does WHO plan to fight the obesity menace?

In 2002, WHO and the Food and Agriculture Organization (FAO) came out with a technical report called TRS 916, which said that calories from sugar should form 10 per cent of the daily diet; and that high intakes of energy-rich and micronutrient-poor foods, sugar-sweetened drinks and fruit



NO PLACE IS SAFE

Deaths caused by communicable and non-communicable diseases (Figures multiplied by 1,000)

Region	Communicable diseases	Non-communicable diseases
Africa	7,779	2,252
The Americas	875	4,543
Eastern Mediterranean	1,746	2,030
Europe	567	8,112
South East Asia	5,730	7,423
West Pacific	1,701	9,000

Source: Presentation by Robert Beaglehole, director, health promotion, surveillance, prevention and management of NCDs, WHO. Presentation based on World Health Report 2003

juices, large portion sizes of food in restaurants and extensive marketing of such foods are some of the causes for obesity.

Based on this report, the WHO began to develop a Global Strategy on Diet, Physical Activity and Health from November 2003 onwards. The strategy said that governments must change agriculture, fiscal and regulatory policies, strengthen surveillance systems and improve consumer education to prevent the spread of NCDs. The strategy also urged governments to push towards growing more fruits and vegetables, giving subsidies to healthy food and educating people about food to fight obesity.

But big food businesses feared that if they did not act fast, the strategy would become a success like the Framework Convention on Tobacco Control. The WHO has repeatedly said that food is not tobacco and it wants to cooperate with the industries. But the industries don't want any restriction on intake of sugar and high-energy food.

3. What is the processed food and soft drink industry's contribution to the obesity epidemic?

Bad food is being indicted by researchers across the world. They blame sugar- and fat-rich foods for obesity-related diseases. Jim Mann, professor of human nutrition and medicine at University of Otago in New Zealand, has reviewed several studies, which found that:

- When people were asked to cut down intake of sugars and replace it with starchy foods such as potatoes for five months, they lost weight.
- When overweight people were asked to reduce fat consumption, they lost weight.
- People eating high-fat or high-sugar diets gained weight. The weight gain in people having high sucrose diet was double that gained by people on high fat diet.
- Children drinking soft drinks rich in sugars gained weight with each serving of a drink.
- Food and drinks rich in sugar have higher energy and lead to weight gain as compared to low energy, artificially sweetened food.

Researchers in the UK have found that children who regularly consume carbonated drinks are more likely to gain weight over a year compared to other children who drink water or fruit juice. But while research has proved that there is a link between food and obesity, the food industry does not accept that their products are causing harm.

The WHO says data from numerous studies show that the high and increasing consumption of sugar-sweetened drinks by children is of serious concern. These studies estimate that each additional can or glass of soft drink that children consume every day increases their risk of becoming obese by 60 per cent.

4. Why should governments target advertisements that "persuade" children?

The WHO strategy indicted food advertising as a cause for obesity in children. Fast foods and beverages, usually classified under the "eat least" category in dietary guidelines, are the most heavily marketed products. Young children are the more preferred audience for the advertisements of such products because children significantly influence the food bought by parents. In the US, in 1997, manufacturers spent US \$11 billion on "eat least" choice food and beverages. *"A recently published industry-sponsored report reported that there is no evidence to show a direct causal relationship between food advertising and obesity level. However, a systematic review commissioned by United Kingdom's Food Standards Agency*

RATED X FOR CHILDREN

McDonald's slogan "I'm lovin' it" may soon cease to be heard during children's TV programmes in the UK. The Labour government is considering banning fast food makers from advertising their products during children's TV. This follows a House of Commons health committee report, which says that obesity in the UK has risen by 400 per cent in 25 years. The report recommends that fast food companies voluntarily withdraw advertisements from children's TV within three years. Children in the UK are exposed to about 1,150 junk food ads each day. But UK's Advertising Association claims that the report is based on inaccuracies, including the assumption that advertising influences food choice.

The country is also considering slapping a tax on fatty food. A recent document brought out by prime minister Tony Blair's strategy unit observes that taxing unhealthy food might work as a "signal to society", helping people make the right choices. If imposed, the tax would affect the prices of burgers, cakes, biscuits, pizzas, potato wedges and chocolates.

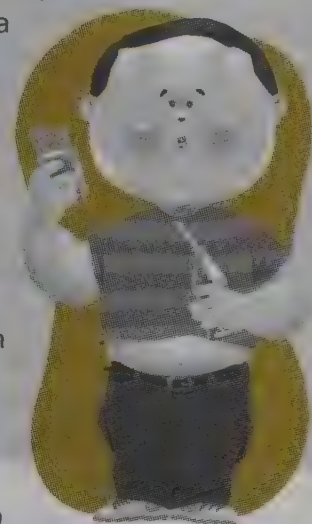


THE YOUNG AND THE OBESE

Children and the young are the food industry's best customers. Around 17.6 million children younger than five are estimated to be overweight worldwide. In USA, obesity is the most prevalent disease among children and young adults.

In 1999, companies spent an estimated US \$30 billion on direct and indirect food advertising in the US. A mint brand could have an advertising budget of US \$10 million, but a US government campaign like the 'five a day fruit and vegetable programme' in its best funded year had a meagre US \$2 million budget, says a World Bank study. For every dollar spent in the US on nutrition education, the food industry spends an estimated US \$5,000 on food advertising.

Coca-Cola, the world's largest soft drink group, won the global marketing rights for the first Harry Potter film at a reported cost of US \$182 million. Soft drink consumption in the US has increased by 300 per cent in 20 years. Even schools aren't safe from soft drinks and fast food. They sign "pouring rights" with soft drink companies to get funds. The vending machines are put up at vantage points in schools; even water fountains have been removed to create space for them. Approximately 60 per cent of middle and high schools in the US have soda vending machines. Such contracts have provided schools with more than US \$200 million in revenue, but the consequence is that 56 per cent to 85 per cent of school students consume at least one soft drink daily.



(FSA) found that advertising does affect food choices and influence dietary habits," said the WHO.

It also supported the policies of governments (Austria, Belgium, Luxembourg, Norway and others) that had prohibited advertising before and after children's programmes. In other countries like Finland and Germany, persuasive advertising to buy a product through direct offer is prohibited. In Italy, advertising during cartoons or using cartoon figures is prohibited. But distressingly, the Indian government has not taken any of these steps to regulate the advertising of junk foods and soft drinks, which targets children.

5. How did the companies oppose the WHO strategy?

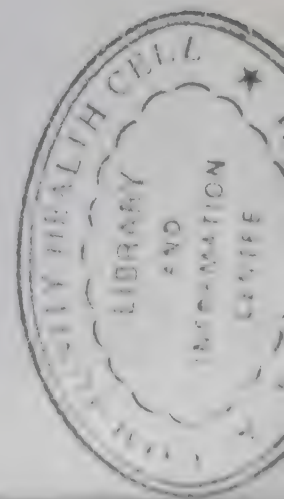
They brought into play the power of the US government. In the US, the industry has pressured for new laws which make choosing what food to eat a personal responsibility. The Personal Responsibility in Food Consumption Act, passed by the House of Representatives on March 11, 2004, prevents "frivolous lawsuits against the manufacturers, distributors or sellers of food or non-alcoholic beverage products". Senator Mitch McConnell, who introduced a companion bill called the Commonsense Consumption Act in the Senate, says, "Americans need to take greater care in what — and how much — they eat."

Globally, the sugar and food industry and their lobbyists have tried to discredit the strategy by saying that any link between obesity and diet is bad science. Civic groups say the same tactic is used by the tobacco industry, which says there is no clear evidence to show smoking affects health. But to support industry, the US government produced a 28-page response to TRS 916, which accuses the strategy of "lack of transparency in the scientific and peer-review process". Continuing with this bad science tirade, in February 2004, William Steiger, special assistant to USA's secretary for international affairs, sent his comments on the strategy to WHO's director general. Steiger heavily edited and diluted the strategy and called for weaker and vague measures like "better data and surveillance, and the promotion of sustainable strategies that focus on energy balance, individual responsibility, and strong public health approaches."

6. Why is the strategy being opposed, particularly by the sugar and food industries?

The Global Strategy on Diet, Physical Activity and Health is a guideline, not a treaty or law, to prevent chronic diseases, but it has become controversial because it makes governments and industry responsible for the food people eat. If implemented, the strategy could give health ministries control over commerce, industry, finance, environment and urban planning ministries. These ministries will have to come up with national dietary guidelines, correct and scientific information on food, nutrition labelling and marketing and promotion of healthy diet. They will also have to undertake measures which would hurt business — implement policies, for instance, making unhealthy food expensive or remove subsidies on sugar (an issue that nations are fighting over in the WTO forum). If the strategy is accepted, countries would have to form new food pyramids on whether fats or carbohydrates should be a major part of diet.

The strategy puts responsibility on the food industry too. The industry would have to limit the levels of saturated fats, trans-fatty acids, free sugars and salts in food products, provide information to consumers and practise responsible marketing. 'Good food is not good business' for these companies.



7. What is the power of industry over the US government?

Firstly, there is the US sugar industry, one of the most pampered and powerful in the world. Domestic sugar price in the US has remained three times lower than that of world prices in the last decade. USA's Sugar Act of 1934 restricts imports and ensures that the government stores excess domestic production. Americans pay US \$2 billion annually in inflated sugar prices because of this policy. Using its massive profits, the sugar lobby since 1990 has donated more than US \$18 million to Democrats and Republicans. It has given US \$490,000 — a trifle compared to the profits — to the congressional and presidential candidates for the 2003-2004 elections. This lobbying has always worked. In December 2003, the US agreed to import one per cent of the sugar it needs from five Central American countries, but its sugar industry has teamed up with the wheat and maize industry to oppose the agreement. During the January 2004 trade talks with Australia, the US refused to open up its sugar market.

Secondly, there are the interests of powerful processed food industries, which involve global markets. The US government would like to ensure its industries can sell their junk food to developing nations, where the money is. Coca-Cola earns over 70 per cent of its profits outside the US. The value of Coke's brands increased from US \$68.95 billion in 2001 to US \$69.64 billion in 2002 because of growing sales in developing countries. By 1993-end, one third of McDonald's stores were overseas, accounting for half of its profits. Four out of every five new McDonald's restaurants are now opening abroad rather than in the US.

8. India has a problem of malnutrition and not obesity; so why should we care?

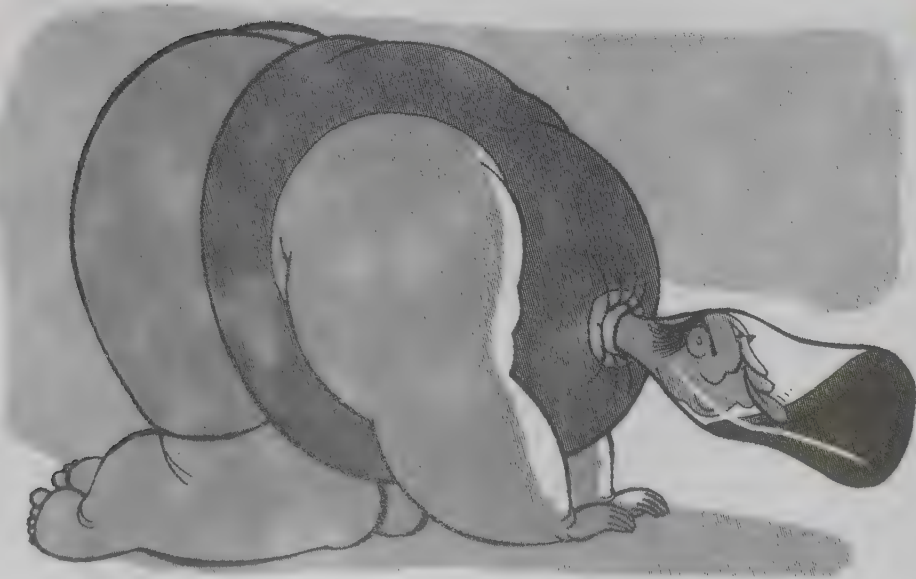
We not only have the diseases of the poor, but now the diseases of the rich are growing enormously, which will put an increased burden on our health services. As many as 25 per cent of Indian men and 36 per cent of women above 20 have a BMI of more than 25 kg/m², says a national survey carried out in 2000. India also has the highest number of diabetes patients in the world.

The WHO has found that incidence of osteoporosis — growing because of replacement of milk with beverages — is many times higher in affluent developed countries than developing countries; but it expects to see a four-fold increase in hip fractures by 2050 because of the globalisation of diets and lifestyles.

The 2003 WHO report on 'diet, nutrition and the prevention of chronic diseases' projects that by 2020, chronic diseases will account for three-fourth of all deaths worldwide: 71 per cent of deaths due to ischaemic heart disease; 75 per cent due to stroke, and 70 per cent due to diabetes will occur in developing nations. The number of people with diabetes in the developing world will increase more than 2.5 fold — from 84 million in 1995 to 228 million in 2025. On a global basis, 60 per cent of the burden of chronic diseases will occur in the developing world.

9. What has been India's response to the WHO strategy?

But instead of proactively curbing the march of obesity in the country, the Indian government has chosen to complain against the strategy. A letter sent to the WHO by B P Sharma, joint secretary in the Union ministry of health and family welfare, says: "It should be understood that the requirements of developed countries and (other) countries like India cannot be the same. Developing countries with a large population engaged in physical labour need energy-rich diets like fats and sugar. The decision to eat or not to eat a food rests with an individual." This is similar to what the US government and its industry say about the strategy.



10. So what happened at the 57th World Health Assembly in Geneva in May?

The Global Strategy on Diet, Physical Activity and Health was endorsed at the 57th World Health Assembly. The tricky issue of sugar saw a dilution. A paragraph was added to the resolution, which stated that appropriate levels of intakes for energy, nutrients and foods, "including free sugars, salt, fats, fruits, vegetables, legumes, whole grains and nuts" would have to be determined. These would be in accordance with "national" dietary and physical activity guidelines. Therefore, as usual, developing countries were left to the devices of the processed food industry and corporations in the name of free choice.

6

Poison beyond the product

Analysis of sludge from soft drink plants reveals presence of hazardous wastes



What the JPC says:

"The Committee were informed that due to operation of Coca-Cola and PepsiCo plants at Plachimada in Palakkad in Kerala, agricultural operations have been badly affected. It has been alleged that operations of these plants have resulted in causing pollution of water, depletion of groundwater, reduced yield in crops, skin disorders and other ailments among inhabitants.... The Committee have been informed that the Hon'ble Supreme Court has constituted recently a Monitoring Committee on Hazardous Waste Management. One of the terms of reference of this committee serviced by the Ministry of Environment and Forests is to oversee the implementation of hazardous waste management and submit a report to the Court on a quarterly basis. It has jurisdiction over the entire country. The Committee suggests that implementation of discharge of effluent sludge in Palakkad and Plachimada be also monitored by the above Monitoring Committee."

— Report of Joint Committee on Pesticide Residues in and Safety Standards for Soft Drinks, Fruit Juice and other Beverages, Chapter II, Conclusion/Recommendation 2.187

1. How hazardous was the sludge of the soft drink companies?

In July 2003, the analysis report of the sludge collected by visiting BBC reporters from the Coca-Cola factory in Plachimada came out in the public domain. It revealed that the sludge was hazardous – with high levels of heavy metals like cadmium and chromium. After this analysis created a furore, the Kerala state pollution control board (KPCB) was activated. The board collected sludge from the factory and confirmed the BBC

CRUEL COMPOST

Soft drinks plants consistently produce hazardous waste they pass off as compost

		Cadmium	Lead	Chromium	Nickel	Zinc
1.	Coke: Plachimada 29.7.03 (KPCB)	201.8 mg/kg	319 mg/kg			
2.	Coke: Plachimada Aug 03 (KPCB)	17.1 mg/kg-36.5 mg/kg				
3.	Coke: Plachimada 12.9.03 (CPCB-KPCB)	338.8 mg/kg	3471 mg/kg	759.6 mg/kg	69.6 mg/kg	3810 mg/kg
4.	Pepsi: Kanjikode 29.7.03 (KPCB)	109.5 mg/kg				
5.	Coke: Dankuni, WB	56 mg/kg	1043 mg/kg			
6.	Coke: Taratola, WB	69 mg/kg	805 mg/kg			
7.	Pepsi: Sonarpur, WB	32 mg/kg	695 mg/kg			
8.	Coke: Varanasi, UP	Above 50 mg/kg				
9.	Coke: Kanpur, UP	Above 50 mg/kg				
10.	Coke: Thane, Maharashtra	Above 50 mg/kg				
11.	Moon Plant: Sahibabad, Ghaziabad	Above 50 mg/kg				
12.	Dasna, Ghaziabad	Above 50 mg/kg				
	Standard for disposal as compost	5 mg/kg	100 mg/kg	50 mg/kg	50 mg/kg	1000 mg/kg
	Standard for disposal as hazardous waste	50 mg/kg	5000 mg/kg	50 mg/kg	5000 mg/kg	20,000 mg/kg

Source: 2003, *Heavy Metals and Pesticides in the Beverage Industry*, Central Pollution Control Board



study that showed high levels of cadmium and lead. This sludge was being “given” away by the factory to local farmers as compost. But interestingly, the same pollution control board revisited the factory within days to collect new sludge samples and this time, almost magically, the sludge samples were found clean. The hazardous waste had disappeared. But at about this time, the Centre for Science and Environment’s study on pesticides in soft drink study hit the stands, and the Central Pollution Control Board (CPCB) was forced into action. It decided to check the samples and, this time, the joint team, found high levels of hazardous waste had appeared once again (see table: Hard to swallow).

Subsequently, the CPCB conducted studies in different plant locations. Its November 2003 report on *Heavy Metals and Pesticides in the Beverage Industry* has never been made public, but was submitted to the JPC. The results of this survey show that many of the

plants had waste, which should be classified as hazardous waste.

The problem was that the companies were disposing off their waste as ‘environment-friendly’ compost. However, the analysis found, the cadmium content in the sludge of all the plants was way above the standard for sludge that can be disposed off as compost. It is not clear what action has been taken by the pollution control boards to penalise the companies and to compensate for the damage this disposal of their sludge would have caused.

Furthermore, there were many instances when the levels of cadmium in the sludge even exceeded the norms for sludge that has to be disposed off as hazardous waste. Therefore, these companies would have to dispose off their sludge in a secure landfill site.

2. Why was hazardous material found?

Nobody quite knows. But what is clear is that the companies had been given clearance on the basis that their waste was not hazardous. For instance, in the case of the Plachimada plant of Coca-Cola, the Kerala State Pollution Control Board granted consent to operate on the basis of the standards laid down under the Environment Protection Rules, which only list norms for water and air. These standards are as follows:

- Water
 - PH: 6.5-8.5
 - Suspended solids: 100 mg/l
 - Oil and grease: 10 mg/l
 - BOD: 30 mg/l
- Air
 - SPM: 1200 mg/Nm3 (this is 6 times higher than what is even permitted to a thermal power project)
 - Sox: 1200 mg/Nm3

3. What action has been taken by CPCB after they found hazardous sludge?

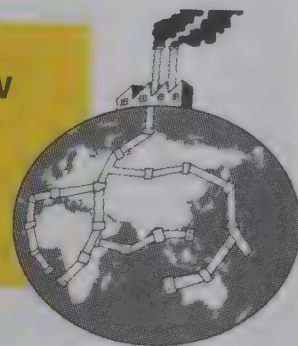
The CPCB informed the JPC that it has advised the state pollution control boards to direct the units to dispose of the sludge as per the Hazardous Waste (Management and Handling) Rules, 1989. This was to be done wherever the sludge was found to be above the prescribed limits for hazardous waste. Where the limits were below the prescribed limits, the sludge was to be disposed off as industrial solid waste and not as compost. The companies have been told to update their effluent treatment plants to conform to prescribed standards for heavy metals in the treated effluent.

However, there is little information if this direction has been complied with.

7

Material misuse

Should soft drink and bottled water companies be allowed to use water, a raw material in their product, for free? Should there be restrictions on the use of water by these companies?



What the JPC says:

"The Committee find that though these companies are extracting huge amounts of groundwater but they are not being charged anything for using the water. The only charges that they pay is a petty amount as water cess which is being levied by the State Pollution Control Boards... Though the Secretary, Ministry of Water Resources tried to put forth the legal position in this regard before the Committee by stating that no charges can be levied on the use of groundwater because legally speaking, the land and the resources located under it belong to the owner who is free to use his assets in the manner he likes, but in view of the recent judgement delivered by the Hon'ble High Court of Kerala... in the case of Plachimada plant of Coca-Cola India, the stand taken by the Secretary loses relevance. The Hon'ble High Court has opined... that the use of water is free only in case the same is used for domestic or agricultural use by the owner and since groundwater belongs to the public, its commercial use has to be adequately restricted and even in the absence of any law governing groundwater, the panchayat and state are bound to protect groundwater from excessive exploitation... The Committee however, note with utter dismay that the Central Ground Water Authority (CGWA)... has so far hardly taken any concrete steps to properly regulate or coordinate effectively the extraction of groundwater for industrial purposes. Taking into account that the water level in many parts of the country is getting depleted alarmingly, the Committee desire that this requires to be properly regulated so that at least on account of indiscriminate use of water for commercial purposes the level does not go down further. The Central Ground Water Authority must take immediate steps in this regard and also impress upon the State Governments to do so without further loss of time. The Committee note that water being a State subject, the central legislation cannot be enacted unless the concerned state legislatures pass a resolution and only a few states have enacted laws to regulate over-exploitation of groundwater. The Committee desire that the Ministry of Water Resources must pursue the matter vigorously with the States and impress upon them the need to regulate water particularly for commercial purposes and also fix the price for water after taking into account the price being charged for water which is being used for domestic purposes."

— Report of Joint Committee on Pesticide Residues in and Safety Standards for Soft Drinks, Fruit Juice and other Beverages, Chapter II, Conclusion/Recommendation 2.182

1. How much water do soft drink companies use to manufacture their products?

Nobody knows. Soft drink companies informed the JPC that 89 per cent of their product is water. They also said that for every litre of soft drink manufactured, they use four litres of water. But the companies did not supply the complete information about the amount of water being used in their manufacturing plants. They pleaded for time to collect this information. Ironically, that is also the case with the Union ministry of water resources. On being asked for information on the quantum of water used by soft drink companies across the country, the ministry supplied partial and incomplete data — for only 20 plants out of the existing 90. Even this data was incorrect in many cases (see box: *Government does not know*).

2. What is the relevance of the Kerala High Court judgement on groundwater usage by these companies?

By law, groundwater belongs to the person who owns the land. In other words, the owner of the land is the *de facto* and *de jure* owner of the resource underneath. But as the amount of groundwater that can be exploited does not depend on the amount of land owned, there are no limits to the amount that can be

GOVERNMENT DOES NOT KNOW

In his reply on July 5, 2004 to a Lok Sabha starred question No 2 (dated 5-7-2004) regarding utilisation of groundwater by soft drink companies, the minister of water resources placed information about 20 units located in different states. The minister's information contained average monthly groundwater utilisation by these units (see table below: *What about the rest?*). The following issues arise from this list:

- The list is incomplete. Pepsi has 38 plants, of which 17 are company-owned and 21 are franchisee-owned plants. Coke has 52 plants, of which 25 are company-owned and 27 are franchisee-owned (based on information provided to JPC). The ministry's list is for only 20 of these 90 plants — just 22 per cent of the total plants in the country. Without complete information, it is impossible for the government or the civil society to get a clear view of water usage so that policy correctives can then be made.
- In some cases, the information contained in the list is either incomplete or factually incorrect. For instance, according to the information tabled, the PepsiCo plant in Palaghat in Kerala does not use groundwater for its consumption. But in its replies to the JPC, PepsiCo has stated that it depends on borewell water for its operations in this plant, and the quantum of water it uses has been estimated at 16,500 kilolitres/month.
- On the basis of this incomplete information, the government was however quick to inform the House that the declining trend in groundwater in the areas "cannot be attributed only to groundwater withdrawal by soft drink companies". Furthermore, "water being a state subject, it is primarily the responsibility of the concerned state governments to take remedial steps to check over-exploitation of groundwater".

WHAT ABOUT THE REST?

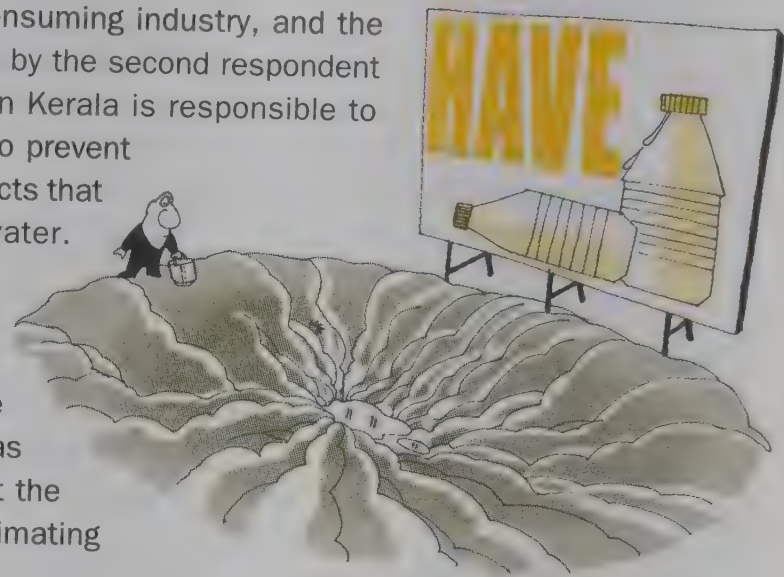
Lok Sabha starred Question No 2 (dated 5-7-2004) accounts for water use by only 20 of the cola giants' 90 plants in India

Sl No.	Name of soft drink manufacturing company	Location	Average monthly ground-water utilisation (kilolitre)
1.	Hindustan Coca-Cola Bottling South East Pvt Ltd	Moula Ali, Hyderabad, Andhra Pradesh	Nil
2.	Hindustan Coca-Cola Bottling South East Pvt Ltd	Ameenpur, Ranga Reddy, Andhra Pradesh	Nil
3.	Narmada Drinks Pvt Ltd (Coca-Cola)	Billaspur, Chhattisgarh	2345.5
4.	Chhattisgarh Beverages (Pepsi)	Urla, Raipur, Chhattisgarh	Nil
5.	Hindistan Coca-Cola Beverages Pvt Ltd	Goblej, Kheda, Gujarat	28500
6.	Surbi Milkfoods & Beverages Ltd (Coca-Cola)	Village Motibhoyan, Kalol Gandhinagar, Gujarat	9960
7.	Pepsico India Holdings Pvt Ltd	Naroda, Ahmedabad, Gujarat	2340
8.	Pepsico India Holdings Pvt Ltd	Jhagadia, Bharuch, Gujarat	Nil
9.	Pepsico India Holdings Pvt Ltd	Nelamanagala, Bangalore, Karnataka	30600
10.	PepsiCo	Bangalore-Mysore Road, Karnataka	7170
11.	Hindustan Coca-Cola Beverages Pvt Ltd	Bangalore, Karnataka	4200
12.	Coca-Cola	Plachimada, Palakkad, Kerala	15000
13.	Pepsi Cola	Palghat Distt, Kerala	Nil
14.	Coca-Cola	Pilookhedi, Distt Rajgarh, Madya Pradesh	Nil
15.	Tripty Drinks (P) Ltd (Franchise of Pepsi)	Jagatpur, Cuttak, Orissa	6000
16.	Hindustan Coca-Cola Beverages (P) Ltd	Khurda, Orissa	Nil
17.	Hindustan Coca-Cola Beverage (P) Ltd	Chomu, Jaipur, Rajasthan	16500
18.	Jai Drinks Pvt Ltd (Pepsi)	Jaipur, Rajasthan	6300
19.	Hindustan Coca-Cola Beverages Pvt Ltd	Dasna, Tehsil Hapur, Ghaziabad, Uttar Pradesh	75000
20.	Diamond Beverages (Coca-Cola)	Kolkata, West Bengal	4380

extracted. Exploitation, therefore, depends simply on the money available to drill deep, electricity for pumping, and the water available in the aquifers below.

But this was till the Kerala High Court, listening to the matter of groundwater use by Coca-Cola in Palakkad district, judged that it was time to interpret the use of resources meant for public use. Justice K Balakrishnan Nair deliberated on how this legal provision, which gives unfettered rights to the landowner to extract groundwater, is adversely affecting people living in the vicinity. He judged that underground water belongs to the public, with the state as trustee, its duty being to prevent overuse. "The inaction of the state in this regard will be tantamount to infringement of the right to life of the people guaranteed under Article 21 of the Constitution of India," he ruled.

The matter pertained to the use of water by a large water-consuming industry, and the judge ruled that this "extraction of water at the admitted amounts by the second respondent (Coca-Cola Company) is illegal". He argued that the *panchayat* in Kerala is responsible to maintain traditional water sources and, therefore, is duty bound to prevent overexploitation of a resource held by it in trust. The judgement directs that the company should not have unrestrained rights over groundwater. Instead, it says that the company, by digging wells, can draw only that amount of groundwater which is equivalent to the water normally used for irrigating crops in a land area the size of the company's plot. In other words, a principle for allocation and use has to be arrived at. The amount of water that can be extracted has to be decided by the *panchayat*, but such extraction cannot affect the availability of drinking water in the neighbourhood. (See box: Estimating groundwater availability and allocation)



Now that the law has been reinterpreted through this judgement, it is necessary to develop a clear policy for groundwater extraction by soft drink and bottled water companies.

3. Why do we need to differentiate between companies that use water for process needs and those that use water as a raw material?

To begin with, most companies using water for process needs use surface water. Use of groundwater is seldom allowed or is feasible for these companies. Soft drink companies use groundwater because it is free from turbidity and suspended particles. Therefore, the treatment costs of groundwater is far lower than that for surface water. In fact, soft drink and bottled water manufacturers are the only major water consuming industrial units that are completely dependent on groundwater.

The other difference between companies that use water in their process (say, the pulp and paper industry) and those that consume water as a raw material — as bottled water and soft drink companies do — is that the former use water for process and then discharge almost the same amount (loss is only by evaporation) as treated wastewater. Therefore, there is no consumption of water in this industry, in the sense that it is transformed into a saleable product. Companies using water for process needs pay water cess to the state pollution control boards. This cess is based on the amount of wastewater discharged which is similar to the amount of water used. However, in case of soft drink companies and bottled water companies, part of the water is "consumed" — used as raw material and sold. This is similar to the situation of the paper industry in the 1970s when it did not pay the price of the raw material — the bamboo and the pulp — they used. In what looks like a bizarre continuance of government's oversight, the current policy does not require soft drink and bottled water companies to pay for the groundwater they consume, as it is based on the assumption that the landowner owns the groundwater below and has full rights to exploit it.

4. If companies paid water cess at the current rate, what would be their water cost?

Currently, industries only pay for water under the Water Cess Act, 1977, which is based on the discharge of effluent. In industries where water is part of the manufacturing process and not the raw material, the consumption is less and, therefore, payment based on effluent is acceptable.

A review of the water cess rates (paid on effluent) in India will show how inadequate the payment is:

- For comparatively clean wastewater (such as used in cooling or boiler feed) the current rate is 10 paise/1,000 litre
- For most polluted water (containing toxics and non-biodegradable wastes) the current rate is 30 paise/1,000 litre.

ESTIMATING GROUNDWATER AVAILABILITY AND ALLOCATION: THE CASE OF PLACHIMADA

The Kerala High Court had directed the Centre for Water Resources Development and Management (CWRDM) to conduct an investigation into the allegation that overuse of water by M/s Hindustan Coca-Cola Beverages Pvt Ltd at Moolathara village in Chittur taluk of Palakkad district had resulted in scarcity of drinking water in neighbouring areas.

Following its investigations, the CWRDM appointed a committee headed by its director, E J James, on the "Investigations on the Extraction of Groundwater" by Coca-Cola submitted an interim report to the High Court in May 2004. The report estimated Chittur's annual available groundwater resources at 66.7 million cubic metre (mcm) and the total annual groundwater recharge at 74.1 mcm. The committee concluded "under normal rainfall conditions, the planned groundwater withdrawal of 5 lakh litres per day by Coca-Cola will not adversely affect the availability of groundwater in and around the factory complex".

A review of the report by the Centre for Science and Environment shows that the committee grossly overestimates the natural recharge (groundwater availability) in the area. No allocation, therefore, can be made from the natural recharge to commercial users like Cola-Cola. They must depend on artificial recharge — collecting rainwater in storage tanks — and recycling and reusing their water.

Let us understand the following issues:
Available annual groundwater resources in Chittur: To estimate this we need to understand firstly, what the volume of rainfall in the block is; secondly, what the natural recharge potential of the land is.

- The average rainfall in Chittur block over 1994-95 to 2003-04 is 1,413 milimetre (mm). The total land area of the block is 261.2 sq km. Therefore, the total volume of rainfall available for natural recharge is 369.1 mcm.
- The natural recharge potential depends on soil characteristics, geomorphology (rock type) and other variables like topography. Given Chittur's characteristics (black soil, granitic rock), what is the potential for natural recharge in this area?

The interim report has estimated that 20 per cent of the rainfall can be recharged. However, the Central Ground Water Board's (CGWB) 2003 assessment of groundwater resources of Kerala estimates that the rainfall infiltration in weathered rock is between 5-8 per cent. The CGWB in its 1997 assessment methodology recommends that for granites, the natural recharge potential is between 2-4 per cent. It is also accepted that the black soils of Chittur are particularly bad for recharge.

Therefore, the estimated amount of natural recharge that is available for use will be between 16.6 to 33.2 mcm based on the natural recharge of 5-10 per cent of the rainfall of the block. In other words, the estimation of the interim report is faulty and cannot become the basis for allocating the block's water resources to different users.

The demand for water in the block: The different users of water in the block and their estimated demand is as follows:

Category of users	Basis of estimating use	Amount of use (mcm)
Domestic use	Population 2001: 1,58,510 x 160 lpcd	9.25 mcm
Irrigation (100 % area)	Cultivable area: 18,287 ha x 0.6	109.72 mcm
Irrigation (at 50% area as estimated by interim report)		54.86 mcm

It is important to note that the interim report also underestimates the requirement from the domestic and irrigation sectors. It has estimated that the total requirement from these two sectors would be 62.5 mcm, which incidentally is also not available if the amount of natural recharge is recalculated. But more importantly, it estimates that 50 per cent of the cultivable area (9,144.00 ha) is irrigated. It then further assumes that the share of the groundwater resources as a percentage of total water required to meet irrigation supply is 50 per cent. It also assumes that the efficiency of the system that harnesses and supplies groundwater to meet irrigation water supply is 60 per cent. This, when its own report admits that groundwater is the only source of irrigation and drinking water in the block.

The assessment of demand from domestic and irrigation and the surplus available for allocation is given below:

	Interim report's estimation of demand, supply and surplus (mcm)	Recalculated estimation (mcm)
Current demand for domestic sector	16.8	9.25
Irrigation (of 50% cultivable area)	45.7	54.86
Total available annual recharge	66.7	16.6 to 33.2
Surplus or deficit available for allocation to commercial sector	+ 4.2	(-) 47.51 to (-) 30.91

It clearly shows that if the amount of natural recharge is recalculated, there is not enough water to allocate for commercial purposes. And if we add to this re-calculation the norm laid down by the National Water Policy — that in allocation of water, priority has to be given to drinking and then irrigation. Only then, and only in the case of surplus availability, can water be allocated to commercial users — then the interim report's assertion that "planned withdrawal" will have no adverse effect stands challenged.

Coca-Cola and Pepsi have disclosed that for making a litre of soft drink, they use about four litres of water — 2.7 litre of which is wastewater, for which they pay water cess.

Let us assume that they are paying the water cess as per the highest existing rate (30 paise/kilolitre or 1,000 litre). This is a gross overestimation as they probably pay a cess of 10-20 paise/kilolitre.

In all this, it is important to understand that current law provides that these companies pay virtually nothing for the raw material that they sell. By considering that these companies use four litres of water to produce a litre of soft drink (at the very minimum), then a simple calculation shows that for every litre of soft drink, the companies pay about 0.1 paise as the water cess. In other words, they pay 1 paise for every 10 litre of soft drink produced. Consider that this same 10-litre soft drink would sell for roughly Rs 200 (@ Rs 20/litre) and that the product is 90 per cent water.

Therefore the amount of money Coca-Cola and PepsiCo paid as water cess to the state pollution control boards in 2003 would be Rs 9.9 lakh and Rs 5.9 lakh respectively.

Given that the turnover of these companies is roughly Rs 7,000 crore annually, the water cess paid as a proportion of their turnover would amount to just 0.002 per cent. Furthermore, they do not pay for the water that is packed and transported out of the plant, as raw material cost.

5. What must the companies do to meet their water requirements?

The water consumption of large commercial establishments like Coca-Cola and Pepsi are so high that rainwater harvesting cannot meet their entire water demand. The amount of water they will put inside the ground through rainwater harvesting will always be less than the amount they withdraw. Therefore, there is no way these companies can recharge groundwater. Groundwater can be recharged only if abstraction (withdrawal) is not more than recharge.

Based on the data given by Coke and Pepsi to the JPC of their different manufacturing units across the country, it can be assumed that these companies can meet roughly 10-15 per cent of their water consumption through rainwater harvesting; therefore, there will always be an overdraft of 85-90 per cent of their water requirement. It is important that these companies are directed to optimise their rainwater endowment and meet their water requirement from it. They can do so by closing their water cycle and becoming a zero discharge plant.

Therefore, to maintain the water balance the companies should:

- Pay for the water they consume — used to bottle and sell;
- This water, which is bottled and taken away, should at the minimum be recharged through rainwater

COKE'S PLACHIMADA: WHAT IS THE WAY AHEAD?

What is Coca-Cola's demand for water in Plachimada?

There are varying estimates. According to a 2002 report of R N Athavale, a consultant for Coca-Cola, the factory would require, at full capacity, 6.35 lakh litres per day. The 2004 interim report of the E J James committee appointed by the Keraka High Court says its measurement of water use during the period of January to March 2004 reveals that the plant would use roughly 5 lakh litres per day. Therefore, the demand for water in the factory would range from 0.182 mcm to 0.23 mcm of water annually. Given that the natural recharge of rainfall is barely adequate to meet the domestic and agricultural needs, no natural recharge — or groundwater — can be allocated to the factory.

What then is the way ahead? The factory should be required to meet its needs through the following approaches:

- Through artificial recharge: by harvesting and storing all its rainwater endowment. We have to, however, note that this will reduce the amount of natural recharge available to the surrounding area.
- Through complete reuse and recycling of the rainwater that is harvested from its complex so that no water is discharged from the factory and it closes its cycle.

The area of the factory is 34 acres and with an average annual rainfall of 1,413 mm, the total collection potential is 0.194 mcm.

On paved areas — rooftops and pavements — it is possible to capture up to 80 per cent of this rainfall.

This would mean that the factory, if it captures the annual rainfall over its entire compound and stores it in tanks, would be able to collect up to 0.155 mcm of water. Given the topography of this region, storage in the form of groundwater is not as effective and storage tanks would need to be constructed for maximising the yield of rainwater. This is equivalent to 67-85 per cent of its annual needs, depending on the quantum of production.

In addition, as it uses four litres of water to produce a litre of beverage, it has the potential of completely recycling and reusing 75 per cent of its water use. This would require investment in technology for water cleaning, which is feasible.

harvesting. In other words, rainwater harvesting should meet up to 25 per cent of water use.

- The rest of the water, which the companies use, should be recycled and reused so that no water is discharged from the factory — closing its water cycle.

6. Why is the Plachimada case about protecting the rights of the panchayat?

The Perumatty *panchayat* (in Kerala's Palakkad district) gave a licence to Hindustan Coca-Cola Beverages Private Limited (HCBPL) in January 2000 to run a bottling plant at Plachimada. The permit was renewed regularly, with the last extension being valid till March 31, 2003. The products to be manufactured included Coke's premium brands — Coca-Cola, Thums Up, Limca, Fanta, Sprite, Maaza and Kinley soda. As the soft drink company set up shop, the *panchayat*'s income got a boost. Annually, it received Rs 4.65 lakh as building tax, a licence fee amounting to Rs 30,000 and Rs 1.5 lakh in the form of professional tax. The factory also hired locals as staff, generating employment. Despite the Coke plant being a source of regular revenue, the *panchayat* decided to crack down on it when local people's complaints poured in regarding deterioration in the quality of water.

The factory is sited in Plachimada village, and lies adjacent to predominantly tribal areas. In early 2002, the local inhabitants first realised that something was amiss. "Rice cooked in the well water, which used to be crystal clear and potable, was now going bad within a couple of hours," recounted Rajamma, a resident of the area. The taste of the water also became different. Apart from the fall in quality of water, villagers detected a sharp dip in the water level.

Matters came to a head on April 22, 2002, when villagers picketed the Plachimada plant. A year later, the 15-member board of the *panchayat* decided not to renew the Coca-Cola factory's licence on the ground of "protecting public interest". It charged the company with "causing shortage of drinking water in the area through overexploitation of groundwater sources".

The *panchayat*'s refusal to grant permission triggered a chain of events, which continue till date. Coca-Cola has taken the matter to the High Court, which has stayed the operation in the plant, pending resolution of the issues related to groundwater availability and usage.

But even as the deadlock continues, it is important to understand that the issue at hand is about the rights of *panchayats* to decide about local resources. Not only is the Perumatty Grama Panchayat pitted against HCBPL and the Kerala government, it ironically has to take on the local self-government department too. In fact, it was the latter's directive to have the matter investigated afresh by officials of other departments that prompted the *panchayat* to file a writ petition in the High Court. In doing so, it asserted its rights under article 243G of the Constitution of India.

The article vests powers in the state governments to endow *panchayati raj* institutions with the authority to handle 29 subjects listed under the Eleventh Schedule of the Constitution. Several key functions like drinking water requirements, minor irrigation works, overall water management, and health and sanitation figure in this schedule. The Kerala government has devolved all the 29 functions to panchayats through the Kerala Panchayati Raj Act, 1994 (KPR). The Act clearly empowers village bodies to regulate the use of a space within its area for specified industrial purposes by issuing or refusing to issue a licence. Chapter 20 of the Act deals with public safety, convenience and health, including waste disposal. It was this provision that the Perumatty panchayat invoked to cancel Coke's licence. The Kerala Panchayats (Licensing of Dangerous and Offensive Trade and Factories) Rules, 1996, issued under sections 232, 233 and 234 of the KPR Act, provide further details and procedures in the matter of issuance of licence. Further, section 218 of the Act stipulates that all waterworks are to be handled by *panchayats*. In addition to these, section 234 (c) gives the *panchayat* the right to implement water supply schemes and sewerage works.

In view of the above, one of the most important functions of a *panchayat* is to ensure that community members get an adequate supply of pure drinking water. The Perumatty *panchayat* stressed that it was not being able to meet this constitutional obligation because of the contamination of drinking water by the Coke plant. It further emphasised: "In exercising (such authority), the government has no power to dictate to a *panchayat*." In this case, the Kerala High Court's decision to refer the company back to the *panchayat* shows that the court respects the jurisdiction of a local government elected under a constitutional provision. Coke moved the court insisting that the *panchayat* is "subordinate to the state government and is expected to follow the...guidelines issued by it".

This is a story that the watchers of democracy in India must watch carefully.



8

Beyond the trade-off

In India today, the poison-nutrition circle is viciously closed. This circle must be broken. For the sake of food safety. For the sake of public health



What the JPC says:

"The Committee were anguished to note that pesticides were being registered by the Registration Committee even when no MRLs had been fixed. It is only after the CSE came out with their report on presence of certain pesticides in the bottled water... that a decision was taken by the Ministry of Agriculture... to discontinue this practice. The Committee desire that this should now be strictly enforced. In order to rule out any possibility of registering the pesticide by way of notification/rule, the Committee recommend that Insecticides Act 1968 should be suitably amended by inserting a suitable clause in this regard."

"The Committee also desire that a review of existing MRLs of the pesticides may be made at regular intervals, in the light of scientific developments and revision of ADI, if any. There is scope to exceed acceptable daily intake (ADI) if high MRLs have been set because ADI is a safety milestone and should not be allowed to be breached and the basic purpose of setting realistic MRLs is to ensure that we remain well within allocated ADI for that pesticide."

"The pesticides which were being used before 1971 i.e. prior to coming into force of the Insecticide Act, 1968 and rules 1971 were included as "deemed as registered pesticides". The Committee notes that many of the MRLs of the "deemed registered pesticides" have not been fixed so far. The reasons given by the Ministry of Agriculture, for not fixing MRLs for deemed pesticides, that at that time, their usage data was not complete, is not convincing as the Committee feel that even if this data at that time was not complete or available, Registration Committee should have asked the manufacturers of these pesticides to supply the data and fix their MRLs. Though many of the deemed pesticides are already phased out, the Committee desires that MRLs of deemed pesticides which are still in use may be fixed without any further delay."

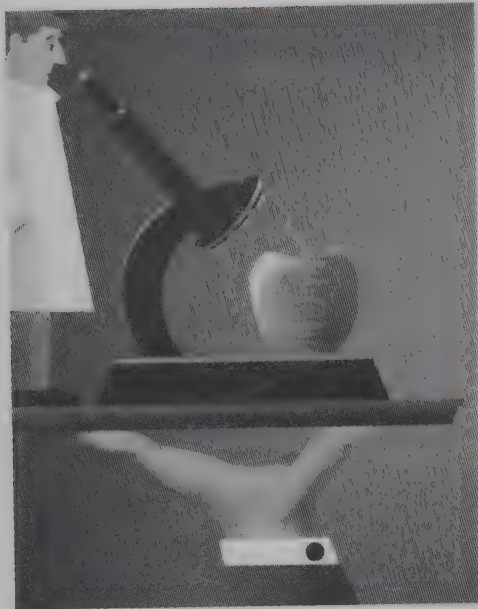
"The Committee also find that neither the Ministry of Agriculture nor Ministry of Health & Family Welfare have any data about the usage of banned pesticides in the States since inception. The Committee wonder as to how the Ministry of Agriculture which have made claims before the Committee towards Integrated Pest Control Programme are monitoring the very use of pesticides in the absence of such vital data. It does speak volumes about the apathetic attitude of the various functionaries. The Committee however desire that Ministry of Health and Family Welfare in coordination with the Ministry of Agriculture should impress upon the State Governments the imperative need of strictly adhering to the guidelines for usage of DDT, Lindane and other restricted pesticides for health programmes only. The farmers too need to be educated properly in this regard."

"No agency regularly monitors pesticide residues in market samples or undertakes diet basket surveys to assess actual exposure of consumers from pesticide residues in food or water and project health risk, if any. Such activity comes under the purview of Ministry of Health but no comprehensive regular monitoring programme is being conducted in the country. The Committee feel that such monitoring of food commodities requires to be done extensively and on yearly basis."

— Report of Joint Committee on Pesticide Residues in and Safety Standards for Soft Drinks, Fruit Juice and other Beverages, Chapter III, Conclusions/Recommendations 3.46, 3.47, 3.48, 3.51 and 3.56

A. The global scenario: what the world does for food safety

1. How much is safe? Do apples have more pesticides than say, Coke or Pepsi?



Perhaps. But it is important to understand that if residues in beverages are less than what you are allowed in an apple, it does not make the beverage safe or the apples unsafe. To understand the numbers that determine ‘safety’ we would have to understand how safety is determined in the business of pesticides.

Let’s be clear: pesticides are toxins, chemicals designed to kill insects and other creatures at low doses. Unless our exposure to toxins is regulated and minimised, there are serious health implications. Therefore, it is critical to determine the amount of pesticides we can be exposed to over a lifetime.

2. Why do we have to accept pesticides in our food? Why should we have to spend money to regulate pesticide residues in our food?

What is ‘safe’ means calculating what we eat, how much we eat and how much pesticide is allowed in the food we eat. Therefore, the food basket is also the pesticide basket. Put simply, we have to eat pesticides because we have to eat food for nutrition, but we must not exceed our quota because that would be deadly. Call this the

nutrition and poison trade-off. As long as we cannot wish away pesticide use, it is imperative that this evil is prudently handled.

3. What are the global systems that regulate food safety?

The world awoke to pesticide contamination of food years ago. As early as 1953, a resolution at the World Health Assembly expressed concern about “the increasing use of various chemical substances in food”. This inaugurated a process that led, two years later, to the ‘Joint Food and Agricultural Organization (FAO) and World Health Organization (WHO) Expert Committee on Food Additives’ (JECFA) being formed. JECFA’s initial mandate was to review and set safety standards only for all food additives — it defined additives as “non-nutritive substances added intentionally to food, generally in small quantities to improve its appearance, flavour, texture or storage properties”. Later, its mandate was broadened to include substances “unintentionally” introduced into food, such as pesticides and metal residues.

Then in 1961, this latter function was turned over to another body. The JMPR, or the ‘Joint FAO/WHO Meeting on Pesticide Residues’, which provides scientific advice to the Codex Alimentarius Commission (a wing of the United Nations to oversee fair international trade practice in agricultural commodities) on regulating pesticide residues in global food trade, was established to direct global food standards for pesticide contamination. Today, while these agencies set the global framework for safety, nations individually develop their own standards to combat the risk pesticides put humans into.

4. How is food safety defined?

“All substances are poisons; the right dose differentiates a poison and a remedy.” Modern food regulation is about determining what is that right dose in our daily diet.

Calculating our exposure — what we can eat safely — requires regulators to understand what we eat and how much. It is a combination of health and toxicological science — to determine the level at which the chemical does not have any adverse impacts; of agricultural science — to determine the least possible pesticide residue on the crop that is feasible; and of nutrition and dietary science — to calculate what we eat and how much pesticides will we ingest.

5. What does ‘Acceptable Daily Intake’ (ADI) mean?

ADI is the safety touchstone for regulating pesticides in food commodities. Problems posed by pesticides led to the global scientific community developing the concept of ADI. The ADI principle refers to the amount of a pesticide we can ingest, daily, over a lifetime, without damaging our health. It is expressed in relation to bodyweight (bw), so that safety levels of pesticides for adults and children can be calculated separately. Regulators across the world make sure that pesticide exposure of the population never exceeds the ADI. The following process is used to develop ADI (see flow chart: *Calculating ADI*): toxicity tests are done on animals, which are given different amounts of a pesticide and checked for a range of toxic effects, including birth defects, cancer, reproductive changes, neurotoxicity and harm to organs such as the kidney or liver.

The idea is to determine that limit till where a pesticide cannot cause harm: this is called NOAEL, or 'No Observable Adverse Effect Level'. Sometimes, it is not possible to deduce this number. In such cases the safety mark is established at that point where the first sign of adverse effect appears. This is called LOAEL, or 'Lowest Observable Adverse Effect Level'.

Both these measures indicate the long-term effect on health, or chronic toxicity. But pesticides are highly poisonous; a single dose can be lethal. To tackle such circumstances, global agencies also establish safety limits for acute toxicity or exposure in the short term. Thus, the JMPR and the USEPA set what is called the Acute Reference Dose (ARfD), the maximum pesticide residue that can be allowed for one-time exposure. Acute toxicity is typically calculated from Lethal Dose 50 (LD-50) — literally a potent quantity of pesticide that can kill 50 per cent of test animals either through ingestion or through contact with skin.

Scientists then extrapolate animal toxicity data on humans. They adjust it downward usually by a factor of 100: a division factor of 10 is used to allow for the possibility that humans are more sensitive; a further division factor of 10 is used to allow for differences between individual humans. Nowadays, there is increasing concern that this safety factor leaves infants and children vulnerable to pesticide toxicity attack. In the US, for instance, health activists want a further safety factor of 10 for children — so that the toxicity data is adjusted downward by a factor of 1,000 — especially for organophosphate class of pesticides.

Today, the use of ADI is a crucial tool to manage pesticide risk.

CALCULATING ADI

Touchstone of food safety

STEP 1: NOAEL

Work out the NOAEL, or no observable adverse effect level. This is done by conducting tests on animals, mostly rats and dogs in laboratories.

STEP 1: MRL

Setting the draft Maximum Residue Level (MRL) for each crop and food item on which a pesticide is likely to be present. This is done through supervised trials on the fields, which establish least-possible residue levels on the crops. In addition, compare the draft MRLs with international and other country MRLs to get the range of the best and worst cases.

STEP 2: ADI

Then the ADI is calculated. Divide the NOAEL by a safety factor — mostly 100 times — obtained from inter-species variability (rats-humans) and intra-species variability (between humans).

STEP 2: TMDI

Estimating the exposure level of the pesticide by estimating the theoretical maximum daily intake (TMDI): multiply the sum of the food intakes with the draft MRLs. This calculation is done for different sub-groups of the population — infants and children, pregnant women and the elderly.

STEP 3: COMPARE

Evaluating whether the TMDI level exceeds ADI. If the TMDI is below the ADI, then the draft MRLs are adopted as national standards (as it is determined that this level of consumption will not affect the health of people). However, if TMDI exceeds the ADI, all factors involved in the estimation of a pesticide's standard-setting are reviewed and reworked.

STEP 3A

In case an ADI cannot be established, MRLs are set as "no detection" or that a standard is not prescribed and that these residues are not allowed on food products.

STEP 3B

Adjusting the ADI to build in exposures from other pathways — water and air. In case the MRLs do not provide for other exposures, the MRLs have to be reworked so that exposure from other sources, once included, does not exceed the ADI.

A COMPARISON OF ADIs

JMPR's ADIs are the most lax of the three

Name of pesticide	JMPR-ADI (mg/kg bw)	Year of review	USEPA ADI (called as CRfD)	Year of review	Australian ADI (mg/kg/day)	Year of review
DDT	0.005	1983	0.0005	1994	0.002	1986
Malathion	0.3	1997	0.024	2000	Not in the list	
Monocroptophos	0.0006	1995	0.00005	1986	0.0003	1990
Phorate	0.0005	1996	0.00017	1999	0.0005	1991
Endosulphan	0.006	1998	0.006	1993	0.006	1997
Chlorpyrifos	0.01	1999	0.0001	1999	0.003	1988
Lindane	0.005	2002	0.005	1993	0.003	1986
Carbofuran	0.002	2002	0.005	1987	0.003	1987

6. Who sets the ADI of pesticides?

On the global level, the WHO-FAO joint agency (JMPR) does it — but only for those pesticides that are commonly used across the world. There are many pesticides used in various parts of the world for which JMPR has not set the ADI. The US and Australia are two countries that set their own ADI. Most of the world takes the ADI calculations done by these agencies.

7. Is ADI of pesticides set by JMPR similar to the one set by USA and Australia?

The scientific process of setting ADI has got mired in trade and political issues. It is good for both pesticide as well as food companies to have as high ADI as possible. High ADI means high legal standard for pesticides in food commodities, which ultimately enables companies to sell pesticide-contaminated products in the market.

The JMPR process for setting ADI is a negotiated process wherein national representatives negotiate to decide on a common minimum ADI. JMPR also uses information for setting ADI that it receives from pesticide companies and from member nations. This is the main reason that the ADI that JMPR sets are higher (and therefore more lax) than those set by the USEPA or Australian regulatory bodies.

Take, for example, the ADI for chlorpyrifos, an organophosphate pesticide. JMPR's 1999 ADI for it is 0.01 mg/kg of bodyweight. That for the USEPA, set in the same year, is 100 times lower: 0.0001 mg/kg of bodyweight. Similarly, ADI set by the Food Standards Australia and New Zealand (ANZFA) a decade ago, is 30 times lower: 0.003 mg/kg of bodyweight (see table: A comparison of ADIs).

8. Should India set its own ADI?

Given the enormous scientific and technical work the setting of ADI demands, it would be more prudent to take the ADI calculation from one of the three key agencies in the world. But as ADI is a safety threshold it would also be a precautionary policy to take the lowest (most safe) ADI for our own calculations.

9. What does Maximum Residue Limit (MRL) mean?

Regulating pesticides on the ground revolves around a regulatory yardstick called the MRL — or Maximum Residue Limit — of a pesticide in a food commodity. It is a legally enforceable standard. It is set for a single pesticide, on all the different food items in which that pesticide's residues are likely to be found. MRL is determined via supervised field trials of pesticides on crops. The intention is to arrive at practicable ways to minimise the pesticide residue in crops. Agricultural scientists work to determine the best agricultural practice and recommend the crops for

YOUR DAILY DOSE OF PESTICIDE MALATHION

- Calculate it as per JMPR (WHO/FAO) ADI:
0.3 mg/day x 60 kg of bodyweight = 18 mg/ day for you
0.3 mg/day x 10 kg of bodyweight = 3 mg/day for a child
- Calculate it as per USEPA ADI:
0.024 mg/day x 60 kg of bodyweight = 1.44 mg/day for you
0.024 mg/day x 10 kg of bodyweight = 0.24 mg/day for your child

which a pesticide should be used, and how it should be used. Globally, if pesticide residue in a food commodity exceeds its MRL, then that food is legally considered adulterated, and penalties can be imposed.

10. What is the relationship between MRL and ADI?

The relationship between the MRL and ADI is the one that really determines safety.

Exposure to a pesticide occurs primarily via what we eat. Regulators know the residue level legally allowed for a pesticide on a food commodity, its MRL. Having figured out how much of that food we eat daily, preferably at the national level, they multiply the two quantities to arrive at the pesticide intake we can be legally exposed to. For instance, Indian MRL for the pesticide monocrotophos in rice is 0.025 mg/kg. Indian diet for rice is 209 gms/day. Thus, exposure to this pesticide through rice is 0.005 mg/day.

In this way, after multiplying the MRL of a pesticide on various food commodities with the respective amount of commodities we eat and summing them up, we arrive at the Theoretical Maximum Daily Intake (TMDI). In no case should the TMDI of a pesticide calculated using its MRL exceed the ADI of that pesticide. This is the bottom line of the safety mechanism set across the world for regulating pesticides.

If TMDI is above ADI, then all the factors involved in setting MRLs is reviewed and reworked. To bring the TMDI below ADI, restrictions can be placed on the use of pesticides in food commodities so that the number of commodities through which exposure happens is reduced. Conversely, if permission is given for the pesticide to be used on a new crop, then the entire TMDI process is reworked and the value of MRL of the pesticide on the existing crops is reduced.

In cases where an ADI cannot be established, for example in case of a very toxic pesticide, MRLs are set at 'no detection' levels — here, no residue is allowed on any food commodity. Finally, the MRLs are also adjusted to build in exposures from other pathways such as water and air, always keeping ADI in mind.

11. But how do regulators know how much we eat? Don't diets vary across the world?

The first guidelines for predicting dietary intake were prepared by the Global Environmental Monitoring System (GEMS/Food) in 1989, which were later revised in 1997. Global regulators divide the world into five regional diets (Middle Eastern, Far Eastern, African, Latin American, and European) to estimate what people eat. India falls broadly in the Far Eastern regional diet, which is rice and cereal-based.

The data used to compile these global diet charts is put together using the average food consumption data given in FAO's food balance sheets. Although the food consumption data derived from such food balance sheets could be uncertain, they represent the best available source of data for international comparison and are adequate for predicting pesticide residue intake.

But because such estimates are inadequate for national policy making, it is important for a nation to develop its own national dietary model to estimate exposure.

India's dietary data is published by the National Institute of Nutrition, Hyderabad. But the last data it published was in 1998 under the *Indian Nutrition Profile*. Moreover, the data given in this publication is for the early 1990s. The only latest information on dietary pattern in India is the FAO's food balance sheet.

12. How do governments improve the estimations of how much we eat?

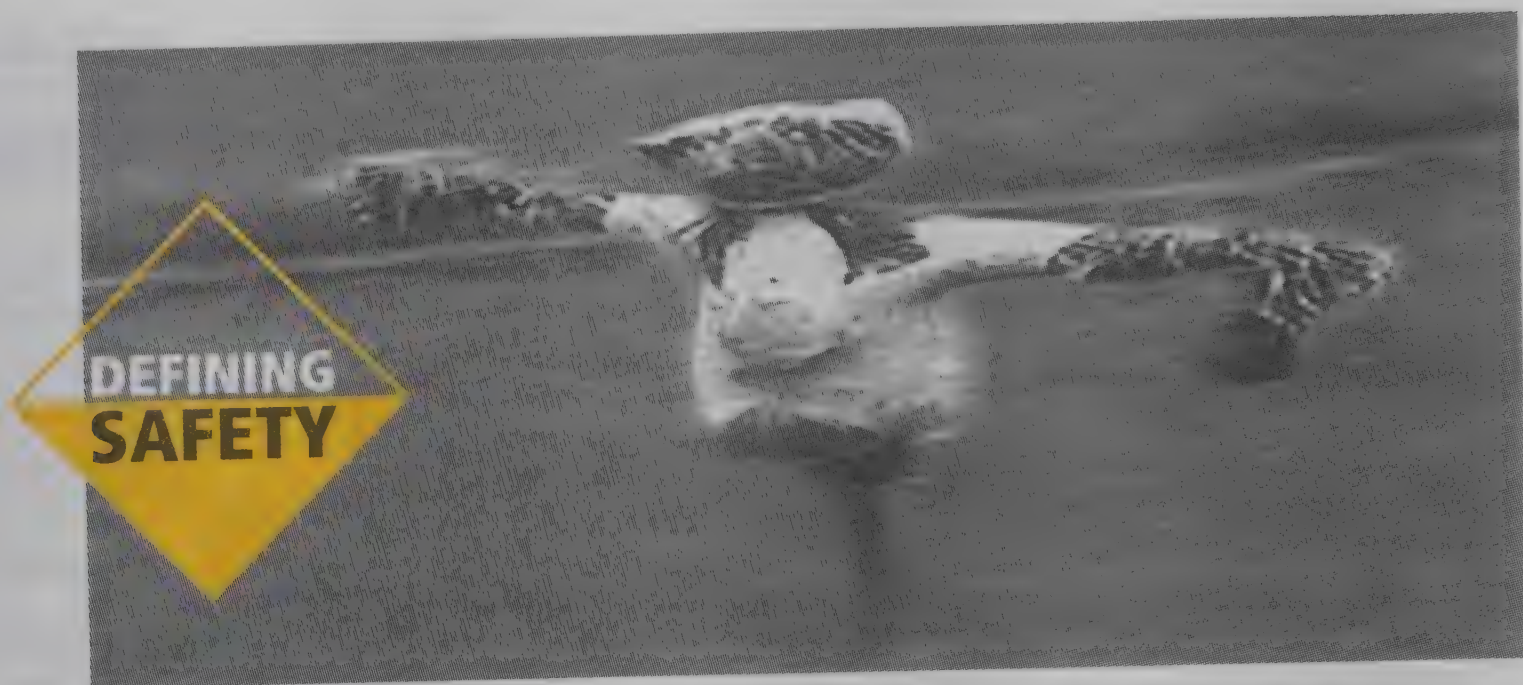
As food consumption patterns vary considerably from country to country and even within a country, individual nations have to also estimate their own consumption patterns. They do this through improvements in their diet studies.

The first level of estimation is based on an average per capita diet: the TMDI. The second and more accurate level is by calculating the exposure based not on the set MRL, but on the actual residues found



The fellow sells cold drinks, mineral water, milk....!





in the food — the estimated daily intake (EDI). The third and most accurate level is by measuring the intake on cooked food — the Total Diet Study.

13. Are countries able to effectively control pesticide contamination in food by using ADI and MRL?

Countries following this process have been able to combat health risks from pesticides. Given below are the examples from some countries:

- **THE UNITED STATES:** The US has assigned clear responsibilities to two nodal agencies — the USEPA and the US Food and Drug Administration (USFDA). The former, a standard-setting body, is entrusted with registering a pesticide for use. Before registration, it establishes ADI — what it calls as Chronic Reference Dose (CRfD) — for that pesticide and sets MRLs for residues on food commodities. It makes sure exposure is well below ADI. The USFDA is the enforcing agency. It ensures MRLs are adhered to. It collects samples of food — raw and processed — and analyses them for pesticide residues, checking them against the USEPA-set MRLs. Samples are collected close to the point of production; also, import samples are collected at the point of entry into US markets. If 'illegal' residues are found in either kind of samples, the USFDA invokes various sanctions, such as a seizure or injunction. As a huge number of pesticides are used in the US, the USFDA uses a multi-residue test method that can detect up to 400 different pesticides in a food commodity. The process the US follows has been able to significantly reduce pesticide exposure. For instance, in 2000, a total of 6,523 food samples — both domestic and imports — were analysed by the USFDA. While pesticide residues were found in 40 per cent of the domestic samples, almost all — 99.3 per cent — had residues below their respective MRLs. In the imported samples, roughly 4 per cent were found above MRL. Exposure to all pesticides was found to be well within their respective ADIs.
- **THE EUROPEAN UNION (EU):** The EU process is quite similar to what the US does. Here, the MRL is legally enforceable; non-compliance leads normally to legal proceedings against the supplier. Of late, the EU's Working Group on Pesticide Residues has adopted a policy of "naming and shaming" suppliers and wholesale agencies whose food samples were found excessively contaminated. The most recent annual report of the pesticide residue monitoring programme, published by the Food and Veterinary Office of the European Commission states that out of the 46,000 samples of fruits, vegetables and cereals tested by the member countries, only 4 per cent of the samples exceeded MRL, that too by a mere 1.3-9.1 per cent. In the EU, too, the exposure is well within ADI.
- **OTHER GOOD PRACTICES:** In Australia, the ANZFA monitors pesticide residues in foods. According to its dietary exposure report for 2002, the pesticide exposure for different ages and genders were below 16 per cent of the ADIs of all pesticides. All the exposures were found to be well within applicable health standards.

In Canada, too, enforcement works. The Canadian Food Inspection Agency (CFIA) tests thousands of samples annually to ensure MRLs are not exceeded. A four-year study from 1994-1998 tested 44,378 products — domestic and imported — and found that 98 per cent of the samples were in compliance. About 93 per cent of processed foods and 75 per cent of fresh samples contained absolutely no residues at all. A five-year study of water wells found that 99.9 per cent of the tested wells met government standards for pesticide residues in water.

B. The Indian scenario

1. How are pesticides regulated in India?

Two legislations regulate pesticides in India — the Insecticides Act, 1968, which is implemented by the Union ministry of agriculture; and the Prevention of Food Adulteration (PFA) Act, 1954, which is implemented by the Union ministry of health and family welfare. The former's provisions are enforced in part by the Central Insecticides Board (CIB) and the Registration Committee (RC) formed under it. The over 25-member strong CIB is headed by the Director General of Health Services and advises on matters related to administering the Insecticides Act. The RC registers pesticides for use in India and for export. This it is supposed to do so after satisfying itself about a pesticide's efficacy and safety to human beings, animals and environment; relevant data to this end are collected from companies.

However, the RC does not consider the ADI of a pesticide to be registered, nor set MRLs on food commodities. In global practices, the agency registering the pesticide establishes ADI, sets MRLs and then ensures that cumulative exposure is within safety levels. In contrast, India registers a pesticide without any of these mandatory safety regulations. In addition, the practice has not been to consider ADI when the pesticide is registered. The regulators do estimate ADI, but this is, unfortunately, incorrectly done. Therefore, it is impossible in India today to determine whether the amount of pesticide one is ingesting from food and water is safe or not.

There is also no legislative provision to link pesticide registration to setting MRLs. The Insecticides Act mandates registration, but the PFA mandates MRLs. Lack of coordination has led to huge irregularities in overall pesticide regulations.

2. Who sets MRLs in India?

MRLs are set by the Directorate General of Health Services on the basis of recommendations made by the Pesticide Residues Sub-Committee of the Central Committee for Food Standards (CCFS), Union ministry of health. The CCFS meets once or twice a year, and standards are set on the basis of information supplied by government research institutions and companies.

In this process, the role that the ADI plays in setting the MRL is minimal. The CCFS has no mandate to establish or consider ADI. Thus, when CCFS develops MRLs, it never cross-checks the exposure levels against ADI. The result is that the legal standards for pesticides in food commodities have no safety considerations built into them.

3. How many pesticides are registered in India and for how many are there MRLs?

Strangely enough, even the data on the number of registered pesticides differs in government records. The number of pesticides registered in the country varies between 178-183 in the various documents of the government. In its counter-affidavit in an ongoing case on pesticide regulation in the Supreme Court (No 185 of 2003), the Union government has given a list of 183 pesticides that are registered for use in the country.

STRANGE RECALCITRANCE

Registration Committee disregards inter-ministerial meeting's decision on pesticide registration

Since June 2003, the government has been discussing the need to register pesticides only after the MRL has been fixed. An inter-ministerial meeting was held on June 2, 2003 under the chairpersonship of the secretary (agriculture and cooperation). The meeting concluded that from now on no pesticide would be registered without fixation of its MRLs by the ministry of health. However, the Registration Committee (RC), in its subsequent meetings, continued to register pesticides without fixing their MRLs.

In its 238th meeting held on September 12, 2003 the RC discussed the decisions reached by the inter-ministerial meeting. The committee decided that it would forward the data required for setting MRLs to the ministry of health and family welfare and wait for a period of four weeks. The RC also decided that if in any event, no response on the MRL was received from the health ministry within the stipulated period, the committee will go ahead and consider the pesticide for registration despite MRLs not being set. The committee reiterated the decision it had reached in its 235th meeting that registration and setting an MRL are different issues.

The website of the CIB lists a total of 179 pesticides. In its reply to CSE in the ongoing Supreme Court case, the government says that presently 178 pesticides are registered for use in the country.

Till very recently, of the 180-odd pesticides registered in the country, MRLs had been set only for 71. That is, more than 60 per cent pesticides registered in the country had no MRLs under the PFA Act. Then in September 2003, MRLs were announced for another 50 pesticides, which on closer scrutiny shows have been set primarily for use in chilli and other spice crops.

The government also says that it is now setting the MRLs for the remaining pesticides. However, its contention that MRLs of only 21 of the 178 registered pesticides have to be legislated, is found wanting. This has been explained below.

4. Are pesticides still being registered without setting their MRL?

In mid-2003, for the first time, an effort was made to ensure that registration of a pesticide by the CIB would simultaneously require that the ministry of health fixed the MRL for that pesticide on different foods. At an inter-ministerial meeting held on June 2, 2003 under the chairpersonship of the secretary (agriculture and cooperation), it was decided that pesticides would not be registered without fixing the MRL.

But what is fascinating is that the pesticide registration committee has refused to accept this directive (see box: *Strange recalcitrance*). In its 238th meeting held on September 12, 2003 the RC discussed the decisions reached by the inter-ministerial meeting. The committee decided that it would forward the data required for setting MRLs to the ministry of health and family welfare and wait for a period of four weeks. The RC also decided that if in any event, no response on MRL was received from the health ministry within the stipulated period, the committee will go ahead and consider the pesticide for registration despite MRLs not being set. It reiterated its decision that the “fixation of MRL subsequent to supply of requisite data is a separate issue and linking this with registration will unnecessary delay registration”.

In a meeting held on March 31, 2004 under the chairpersonship of the additional secretary, ministry of agriculture, to discuss procedure for fixing MRLs for pesticides, it was again reiterated that registration would only be done after the ministry of health fixes MRLs. But the RC has continued to ignore these directions. The data in the table below reveals that the RC went on to register pesticides without fixing MRLs in its subsequent meetings on April 2, 2004; May 27, 2004; and July 2, 2004 (243rd, 244th and 245th meeting of the committee).

The RC has consistently rejected the need for MRL standards being set before the registration of the pesticides on the ground that this will unnecessarily delay the registration process. The process followed

REGISTERED, BUT WITHOUT MRLS

Pesticides registered by the Registration Committee after June 2004 for which no MRLs have been notified under the PFA

Name of pesticide	Date on which registered	Name of applicant	Whether MRL notified under PFA
Chlorpropham	April 2, 2004 (RC meeting 243)	M/s Global Agrosystem Pvt. Ltd.	No
Chlorpropham technical	May 27, 2004 (RC meeting 244)	M/s United Phosphorus Limited	No
Chlorpyrifos methyl technical	May 27, 2004 (RC meeting 244)	M/s De-Nocil Crop Protection Ltd., Mumbai	No
Indoxacarb technical	May 27, 2004 (RC meeting 244)	M/s Gharda Chemical Limited	No
Metalaxyl	July 2, 2004 (RC meeting 245)	M/s Astee Chemicals Pvt. Ltd., Mumbai	No
Thiamethoxam technical	July 2, 2004 (RC meeting 245)	M/s Rallis India Limited	No
Dimethomorph technical Grant of registration for import of Dimethomorph technical and indigenous manufacture of its 50% WP formulation FUNGICIDE	November 4, 2003	M/s BASF India Ltd	No. Provisional MRL set on June 24, 2004 meeting of PRSC. Sent to CCFS for endorsement. Still no MRL notified under PFA.

by the committee, as is evident from the compiled table, is to send the information to the ministry of health for fixation of MRLs. However, when the Pesticide Residue Sub-Committee of the CCFS, the statutory body responsible for setting MRLs under the PFA, requests information, it is not supplied. Therefore, delay takes place and then the committee is able to bypass the provisions by registering the pesticide without setting an MRL.

Throughout the period after the inter-ministerial meeting, the RC has continued to register pesticides for which no MRLs have been notified.

5. Is an MRL set for all the crops for which the pesticide is registered to be used upon?

No. This is a major lacuna in the system. The RC registers a specific pesticide for use on a specific crop. This is a labelling requirement to inform the farmers that the pesticide has been registered and is recommended for use on a particular crop. But, even as the pesticides are registered for a new crop, the MRL is not set (see table: *Saying 'no' to safety*).

SAYING 'NO' TO SAFETY

Registering pesticides for new crops, without setting MRLs

Name of pesticide	Date on which registered	Name of applicant	Whether MRL notified under PFA
Hexaconazole 2% EC (Hexaconazole 5% EC is approved for use on apple, rice, groundnut, mango, soybean and tea crops . Recently Hexaconazole 5% EC has also been approved for use on mango and rice crops)	October 16, 2003	M/s Rallis India Limited, Mumbai	MRL only for apple. Pesticide approved for rice, groundnut, mango, soybean tea, mango and rice crops.
Label expansion of Difenoconazole 25% EC for use on chilli for the control of die-back and fruit rot diseases and on rice for the control of sheath blight disease	November 4, 2003	M/s Syngenta India Ltd., Mumbai	NO. MRL set by the sub-committee on March 15, 2004 only for apple and sent to CCFS. But no MRL for chilli and rice.
Expansion of label & leaflet claims of Propiconazole 25% EC on banana for the control of Sigatoka leaf spot and on coffee for the control of leaf rust	November 4, 2003	M/s Syngenta India Ltd., Mumbai	MRL only for wheat. No MRL for banana and coffee.

6. What is the problem if a farmer uses a pesticide which is recommended to him/her, but which has no MRL set for it?

Under the law, if residues are found on the crop of a pesticide for which there is no MRL, or allowed limit, the crop is adulterated. Therefore, farmers are caught between two laws of the country.

Today, there is huge disparity between two authorities, one which regulates pesticides in the country (CIB) and the other which regulates residues on food commodities (Central Committee for Food Standards, or CCFS). While the CIB recommends the farmers to use pesticides on different crops, the CCFS does not fix the MRLs for the pesticide residues in all the crops that the farmer has been recommended to use. This leads to a gross mismatch between the MRLs set for pesticides and those pesticides recommended for use by the RC. Take, for example:

- In the case of coffee, while 22 pesticides have been recommended for use, MRLs for only two (9.1 per cent) have been fixed.
- 68 pesticides have been recommended for use in paddy, but MRLs for only 41 have been fixed.
- 13 pesticides recommended to be used in sugarcane. MRLs for only 4 pesticides.

This leads to a very unusual situation. A farmer is 'recommended' a pesticide for a crop, and uses it for that crop. In doing so, he or she follows the law as laid down under the Insecticides Act. But if there is no MRL for that pesticide under the PFA Act, the crop cannot legally contain any pesticide residue. Now, if this farmer's crop shows residues of the 'recommended' pesticide, he would be violating PFA provisions.

C. How contaminated is Indian food?

1. Who is supposed to enforce the standards (MRLs) that have been set?

In India, standard-setting is poor, but even poorer is the enforcement of standards. Enforcement is the responsibility of the state governments. In states, food inspectors are appointed. They are supposed to keep proper track of pesticide residues in food commodities. They send samples to the 72 state-run laboratories. From time to time, these laboratories may find contamination, but they cannot act on it. If any sample is found 'adulterated', it has to be sent to the Central Food Laboratories established under the PFA Act. Four such laboratories exist to verify whether contamination exists or not. The long-drawn process means that only rarely can standards be enforced.

This is clear from the following government data: "The Directorate General of Health Services has carried out five surveys on monitoring pesticide residues in food commodities from 1979 to 2001. About 5,000 samples of various food commodities have been analysed and even though majority of the samples had residues of DDT and HCH, these were within the permissible limits."

Therefore, there is no problem, says the government.

2. But is this the fact? Or is it half the fact? Or not the fact at all?

The government has a large monitoring system to check for pesticide residues in food, but it is not used for enforcement.

The All India Coordinated Research Project on Pesticide Residues (AICRPPR) under the Indian Agricultural Research Institute (IARI) has laboratories across the country to monitor pesticide residues. But AICRPPR can only undertake research; it is not mandated to enforce standards. The AICRPPR's inadequacy is evident from the example of a survey it did on branded baby food and milk. The products were highly contaminated (see table: *Poison feed*); but all that AICRPPR did was to

publish the report. Till today, no action has been taken. There are still no pesticide residue standards for these products under PFA.

The AICRPPR's research, which is actually meant to inform the general public about food contamination issues, is not accessible to people. Pesticide residue monitoring data is treated as a national secret, and kept tightly under wraps.



POISON FEED

Pesticide residues found in baby milk powder by AICRPPR

Brand No.	Himachal Pradesh		Hyderabad		Kerala	West Bengal	Bangalore
	HCH (mg/kg)	DDT (mg/kg)	HCH (mg/kg)	DDT (mg/kg)			
BRAND I	3.734	1.47	0.578	0.226	0.251	0.522	0.225
BRAND II	1.128	0.839	1.067	0.32	0.243	0.494	0.013
BRAND III	1.886	0.344	0.415	0.042	0.354	0.142	0.081
BRAND IV	2.863	0.468	0.458	0.021	0.241	0.694	0.071
BRAND V	3.031		0.389	0.054	0.168	0.279	0.026
Average pesticide Residues	2.5284	0.78025	0.5814	0.1326	0.2514	0.4262	0.0832
* Number of times higher than EU baby milk powder norms	252.8	78.0	58.1	13.3	25.1	42.6	8.3

Note: *.EU baby food standard is 0.01 mg/kg for all pesticides.
Source: 'Pesticide safety evaluation and monitoring', AICRPPR, Division of Agricultural Chemicals, Indian Agricultural Research Institute, New Delhi

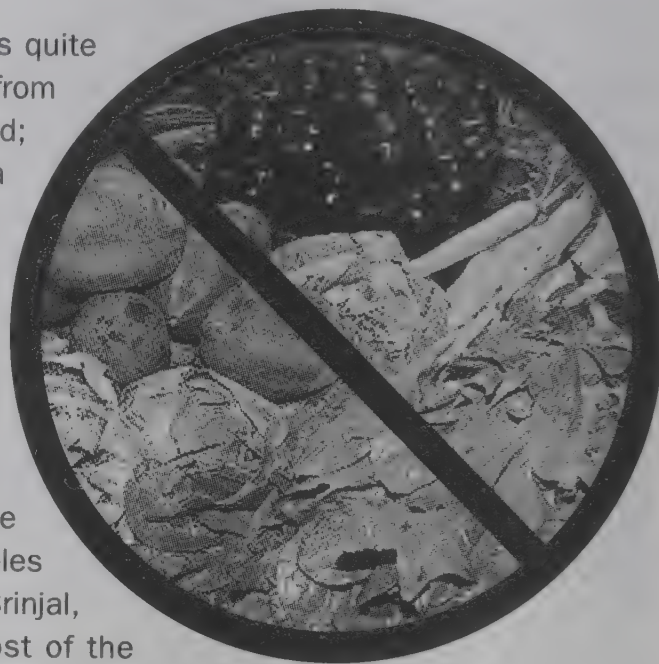
3. So how contaminated is our food?

Pesticides contamination in food and water is a serious problem in our country. According to a 1999 AICRPPR report — *Pesticide Safety: Evaluation and Monitoring* by N P Agnihotri — only 2 per cent of food commodities worldwide were found to be above MRL, but in India this figure was as high as 20 per cent. In Uttar Pradesh and Kerala, food samples exceeding MRL were as high as 46 per cent and 53 per cent respectively. In general, fruits and vegetables and milk are India's most contaminated.

4. How contaminated are our fruits and vegetables?

Indian fruits and vegetables are highly contaminated and exceed MRLs quite frequently. Between 1986 and 1996, AICRPPR analysed 4,111 samples from different states. About 55 per cent of samples were found contaminated; about 10 per cent exceeded their MRLs. Uttar Pradesh and Kerala reported 100 per cent contamination, with respectively 45.9 per cent and 52.8 per cent samples above MRLs. The most contaminated were pigeon pea (58.3 per cent samples above MRL), cow pea (32.7 per cent), snake gourd (19.4 per cent) and cauliflower (16.8 per cent). The three pesticides most prevalent were monocrotophos (31.3 per cent sample above MRL), methyl parathion (30.8 per cent sample above MRL) and DDVP (26.5 per cent sample above MRL).

According to the latest report of the AICRPPR (2001), vegetable contamination remains very high. About 796 samples of different vegetables were analysed by multi-residue method by all the centres of AICRPPR. Brinjal, okra, tomato, chilli, cabbage, and cauliflower were common with most of the centres. Capsicum, cucumber, cow pea, potato, spinach, onion and beans were also analysed by few centres. About 61 per cent samples were found contaminated with residues of different pesticides including endosulfan, chlorpyrifos, quinalphos, DDT, HCH and cypermethrin and 11.7 per cent samples contained residues above their respective MRL values.

**5. How contaminated are milk and milk products in India?**

AICRPPR has tested milk and milk products. Its 1999 report says: "All the monitoring studies carried out in India show that majority of milk samples are contaminated with residues of either DDT or HCH or both, and invariably these exceed their prescribed MRL levels." A total of 487 samples from 14 locations were analysed. HCH showed up in 89.7 per cent of samples, and 77.8 per cent exceeded this pesticide's MRL. In case of DDT, 86.7 per cent samples showed residues and 43.4 exceeded MRLs.

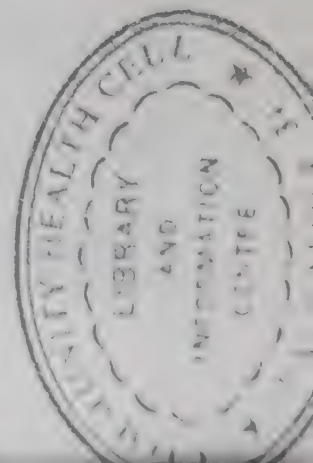
According to the AICRPPR's 2001 report, out of 468 samples of milk analysed by all the 17 centres, 65 per cent contained HCH residues, 15.2 per cent of which were above MRL. DDT residues are still present in 41 per cent of the samples and in 7.7 per cent, DDT was above MRL. Endosulfan, chlorpyrifos and chlorthalonil residues have also been found in milk samples by the Hyderabad, Jaipur and Kalyani centres. Since there is no MRL for endosulfan in milk under the PFA, all the samples where endosulfan was detected are above MRL.

6. How contaminated is animal feed?

Of the 98 samples of feed and fodder analysed by Hyderabad, Coimbatore, Ludhiana and Rahuri centres of the AICRPPR, 52 per cent were contaminated with residues of HCH, DDT dicofol, malathion and endosulfan; in Rahuri, no samples was contaminated. More than 80 per cent of feed and fodder samples of Ludhiana were contaminated with HCH, DDT, dicofol, malathion and endosulfan residues. Since there is no MRL for animal feed and fodder under the PFA Act, all samples were above MRL.

7. What about soil?

Some testing centres — at Ludhiana, Bhubaneshwar, Kanpur, Rahuri, Samastipur, Bangalore, Coimbatore, Hisar, Anand, Hyderabad, Kalyani and New Delhi — analysed soil from cultivated agricultural fields to trace the source of the extraneous residues of some of the pesticides in crops. Bhubaneshwar soil from vegetable and rice fields was found free from pesticide residues, while at all other places the soil was found to contain residues of DDT, HCH, chlorpyrifos, endosulfan, dicofol, butachlor and imidacloprid. Fenvalerate was also detected in soil samples of Kanpur and New Delhi.



A CONSPIRACY OF SILENCE

The Indian Council of Medical Research (ICMR) initiated a multicentric study in 1986 to assess the magnitude of contamination of certain food commodities in rural and urban areas of the country. The data was collected for a period of five years, from 1986 to 1991. Its report published in 1993 — *Surveillance of Food Contaminants in India* — which was not being made public, gives damning evidence against the contamination of food items. It monitored residues of HCH and DDT in bovine milk and infant formula; metals such as arsenic, cadmium, lead, copper and zinc in infant formula, canned food products and turmeric; and aflatoxin B1 in groundnut and maize.

A total of 2,205 milk samples from 12 states of the country were tested for pesticide residues. HCH was detected in 85 per cent samples. The percentage of samples exceeding the maximum residue limits (MRLs) was 21, 42 and 28 per cent in case of alpha, beta and delta HCH respectively. Maximum contamination of HCH was found in the states of Andhra Pradesh, Bihar and Uttar Pradesh. Somewhat similar trend was found in DDT contamination of milk, with 82 per cent samples showing presence of DDT residues; 37 per cent of the samples exceeded the MRL of 0.05 ppm. Maximum DDT contamination of milk was found in Maharashtra (74 per cent) followed by Andhra Pradesh (57 per cent), Himachal Pradesh (56 per cent) and Punjab (51 per cent).

This ICMR study is one of the very few studies carried out in India, which correlate pesticide residues in food with acceptable daily intake (ADI) of a particular pesticide. Since PFA does not set ADIs, the present study used ADIs prescribed by the Codex Alimentarius Commission.

As part of this study, 20 commercial brands of infant formula were also tested. Seventy per cent and 94 per cent samples showed the presence of DDT and HCH respectively. PFA has no standards for pesticide residues in infant formula.

This five-year long study showed that our food products, especially milk, are heavily contaminated. But the study was never released publicly. The director of ICMR had hinted to *Down To Earth* of industry pressure to withhold the study. The excuse was a standard of science: to further validate the findings. It has been 10 years since. The findings have never been validated. Just consigned to the dustbin. In the meantime, contamination grows. A conspiracy of silence if ever there was.

8. Irrigation water?

Irrigation water can also be the source of extraneous pesticide residues in soil and crop. Out of 610 samples of irrigation water (both ground and surface water), 59 per cent of groundwater and 65 per cent of surface water were found contaminated with HCH residues. DDT residues were also detected in 31 per cent of ground water and 33 per cent of surface water samples. Endosulfan residues have been reported in both ground and surface water samples from Kanpur and Kalyani. Chlorpyrifos was found in 76 per cent samples of surface water and 40 per cent of groundwater samples from Hisar. Other pesticides detected in water samples were aldrin, butachlor, chlordane and alachlor at the Jabalpur centre and quinalphos, dimethoate and methyl parathion at the Anand centre.

9. Rainwater?

Sixty-seven rainwater samples were also analysed by 13 centres. While no residues were found by the Bhubaneswar, Hyderabad and Rahuri centres, rainwater in the Jabalpur centre was found contaminated with residues of HCH and DDT. Endosulfan and chlorpyrifos residues were also present in 20 per cent of the samples.

10. But is all this data available to us?

No. Pesticide residue data is treated as confidential by the government. Also, an analysis of the research done on pesticide residues in the country reveals interesting trends: Firstly, while there was substantial and rigorous research done on pesticide residues in the 1960s and 1970s, the frequency of this research started to drop from late 1980s and became non-existent in 1990s. Could this be because of increasing industry pressure and clout? Or is it simply governmental apathy?

Secondly, less and less research is being made public. Pesticide residue analysis is treated as classified secret in national interest. Senior scientists at Punjab Agriculture University told *Down To Earth* that each year they send their research under the AICRPPR to the head office in Delhi for publication. But the last report published by AICRPPR was in 1999. A confidential report is now in limited circulation for 2001. But no data has been made available publicly since 1999. Why? Is this not criminal negligence? Are the scientists not collaborators in this negligent poisoning of India? (see box: *A conspiracy of silence*)

D. How do we measure our exposure to unsafe food?

Each country, which uses and registers pesticides, must do its own homework and must ensure that exposure to each pesticide does not exceed the acceptable daily intake. This is the mandate of safety.

Therefore, we can use pesticides but only after ensuring that these toxins are kept within strict limits, which are not injurious to human health. Without this, the use of pesticides would be deadly. Indeed, it would be criminal.

But that said, we also know that India does not regulate its use of pesticides through this threshold of safety. What then is our situation? If we were to estimate our exposure to pesticides through our food, would it be within the acceptable daily intake?

1. What did CSE do to calculate our exposure to pesticides?

● **STEP 1:** We checked the ADI of key pesticides used in India. Besides JMPR, ADI is also fixed by the USEPA and the Australian government's Department of Health and Aging. Within them, the ADI varied for many key pesticides. So CSE decided to estimate exposure twice — using the ADI of JMPR and then using the USEPA threshold.

● **STEP 2:** We needed data on what, and how much, Indians were eating. We decided to estimate the daily per capita consumption of various food commodities for India. For this, we used the FAO's Food Balance Sheet (FBS) 2001 data for India. The JMPR uses the same source to assess dietary intake. Also, this data is the most recent. The Indian government's published data on dietary patterns is valid only for the 1990s. The last dietary pattern data was published in 1998, giving the dietary pattern for early 1990s (*India Nutrition Profile*, ministry of human resource development, GOI, 1998).

● **STEP 2A:** CSE also wanted to check what the exposure was of society's most vulnerable group — small children. For this, CSE used the average diet of a 10 kg child (average of 1-3 years old, male and female child) from the *India Nutrition Profile* published by the Union ministry of human resource development in 1998. This was the most recent data available on the diet of children in India.

● **STEP 3:** For estimation of pesticide exposure, CSE used the theoretical maximum daily intakes (TMDIs) assessment model, prescribed by JMPR. This model is used as a screening methodology. In this model, pesticide exposure is calculated by multiplying established MRLs with the average daily consumption for each food commodity, and then summing the results.

Exposure = MRL x diet

Using this formula, CSE calculated exposure to eight commonly used pesticides in India.

● **STEP 4:** CSE used the MRLs prescribed in the PFA, 1955 for the legal limits allowed in the food we eat.

2. What did CSE find? How weak are Indian regulations that safeguard our health?

We found our exposure is high and regulations, therefore, are meaningless. They do not adhere to any global norm as far as mandating safety is concerned.



WHAT INDIANS EAT

Average daily per capita intake of food commodities in India as per 2001 food balance sheet of FAO

Product	Daily per capita consumption (gms/day)	Percentage of total daily diet (%)
Total cereals	445	37.1
Total pulses	29	2.4
Total vegetables	239	19.9
Total spices	5.4	0.4
Total fruits	111	9.3
Total meat	14.2	1.2
Eggs	4	0.4
Fish	12	1.0
Milk – excluding butter	179	15.0
Total sugar & honey	105.0	8.7
Animal fats including ghee, butter	6	0.5
Vegetable oils	26	2.2
Oil crops ¹⁹	1.6	
Treenuts	2	0.2
Total coffee and tea	2.0	0.2
Approximate average per capita daily diet	1200.0	

Source: Food Balance Sheet, 2001, FAO

MONOCROPTOPHOS MAYHEM

Estimating exposure to this pesticide for a 60 kg adult (below), and a 10 kg child (below, right)

Food commodity	Indian MRL (mg/kg)	Diet (gm/day)	Pesticide intake (mg/day)	Distribution* (per cent)
Wheat	0.025	158	0.0040	2.6
Rice	0.025	209	0.0052	3.5
Cereals, other	0.025	77	0.0019	1.3
Pulses	0	29	0.0000	0.0
Potatoes	0.05	43	0.0022	1.4
Tomatoes	0.2	20	0.0040	2.7
Onions	0.1	15	0.0015	1.0
Vegetables, other	0.2	160	0.0321	21.2
Condiments and spices	0	5	0.0000	0.0
Oranges & citrus fruits	0.2	20	0.0038	2.5
Other fruits	1	92	0.0921	61.0
Meat and poultry	0.02	14	0.0003	0.1
Eggs	0.02	4	0.0001	0.1
Milk	0.02	179	0.0036	2.4
Sugar & sweeteners ¹	0	105	0.0000	0.0
Animal fats	0.02	6	0.0001	0.1
Vegetable oil & crops ²	0	45	0.0000	0.0
Tea, coffee and cocoa	0	2	0.0000	0.0
Total pesticide intake			0.1510	
ADI			0.0360	
Per cent of ADI			419	

Food commodity	Indian MRL (mg/kg)	Diet (gm/day)	Pesticide intake (mg/day)	Distribution* (per cent)
Cereals	0.025	119	0.0030	9.8
Leafy vegetables	0.2	7	0.0013	4.4
Roots & tubers	0.05	38	0.0019	6.3
Other vegetables	0.2	16	0.0032	10.6
Fruits ³	0.86	20	0.0175	57.6
Meat, Fish & egg ⁴	0.012	10	0.0000	0
Milk & milk products	0.02	164	0.0033	10.8
Pulses	0	20	0.0000	0
Sugar & sweeteners	0	19	0.0000	0
Oil and fats	0.02	7	0.0001	0.5
Condiments & spices	0	4	0.0000	0
Total pesticide intake			0.0305	
ADI			0.0060	
Per cent of ADI			508	

Note: Monocrotophos JMPR ADI = 0.0006 mg/kg of body weight *This means: the proportion of pesticide intake through different food items.

1. There is MRL for sugar beet, but none for sugarcane. Therefore MRL assumed as 0. This is an under-estimation.
2. There is MRL for cotton seed oil but data for consumption not available there for assuming MRL as 0. This is an under-estimation.
3. Consumption data for fruits not available separately. MRL for fruits is weighted MRL of citrus fruits and other fruits using consumption pattern as per FAO 2001 FBS.
4. Separate consumption data not available. MRL for meat, fish and egg is weighted MRL, using consumption pattern as per FAO 2001 FBS. This is an under-estimation.

What we found:

The theoretical maximum daily intake of various pesticides in India presents a horrific picture (see table: *Monocrotophos mayhem*, see graphs: *Toxic intakes I and II*). The comparison of estimated daily intake of pesticides for a 60 kg adult in India with JMPR’s ADI shows that:

In adults...

Of the eight pesticides considered, TMDI for five exceeds JMPR fixed ADI for a 60 kg adult by 40 per cent to as much as 376 per cent. For DDT, the theoretical daily intake of a 60 kg adult in India is about 376 per cent higher; for monocrotophos, one of the most toxic pesticides widely used in the country, the theoretical daily intake of a 60 kg adult in India is about 300 per cent higher; for lindane, endosulphan and phorate, the theoretical daily intake is about 40 per cent, 95 per cent and 61 per cent higher.

But what is truly frightening is what we are doing to the young and vulnerable in our country. A 10 kg child — roughly three years old — is being literally poisoned each day through each meal.

In children...

Of the eight pesticides considered, TMDI for six exceeds JMPR fixed ADI by 14 per cent to a staggering 622 per cent.

Malathion and chlorpyrifos are the only two pesticides whose intake was within the ‘safe’ limit.

But wait. This is because the JMPR’s assessment for these two pesticides allows extraordinarily high exposure. The ADI set by JMPR for these two commonly used pesticides greatly varies from the USEPA and Australian assessment. The JMPR ADI for malathion is as high as 18 mg/day for a 60 kg adult. JMPR had last reviewed malathion in 1997. The most recent review of malathion was done by USEPA in 2000 and based on this review, USEPA has put Chronic Reference Dose (CRfD), which is same as ADI, for malathion as 1.44 mg for a 60 kg adult.

Therefore, we decided to recheck. We ran the same model using, this time, the USEPA-set ADI.

What we found:

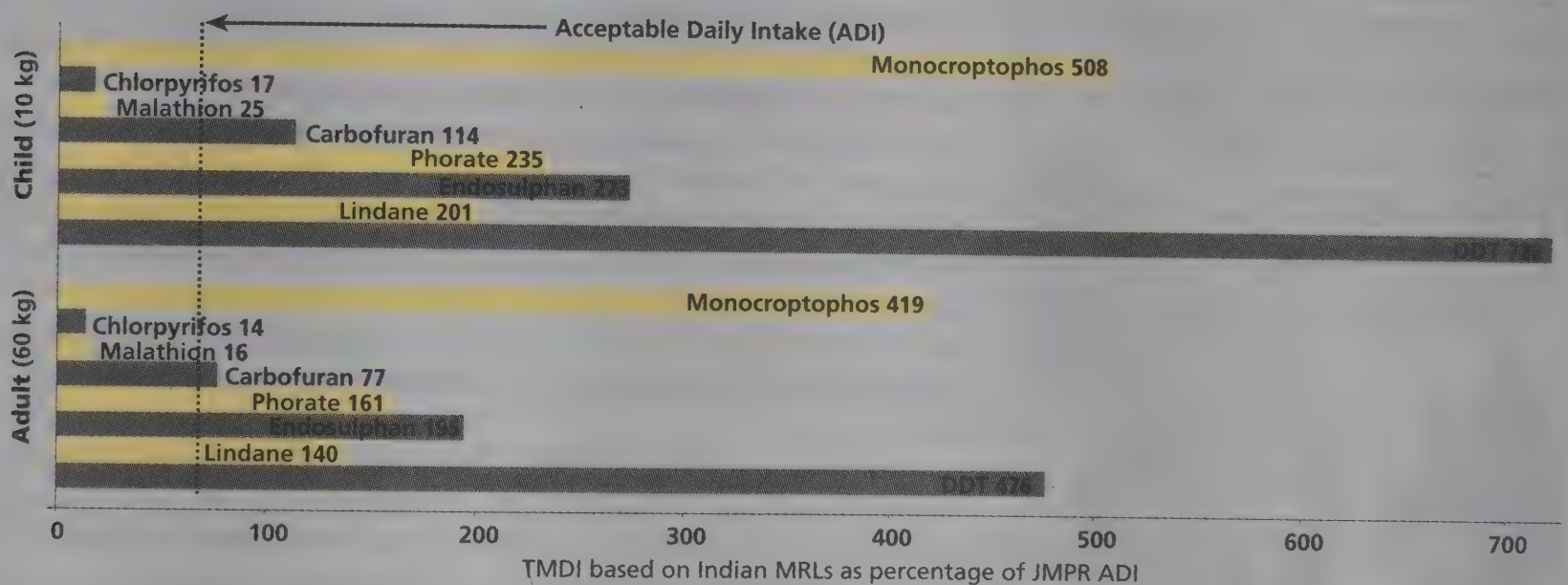
For 60 kg adults, of the eight pesticides considered, the theoretical maximum daily intake for seven exceeded the ADI by 49 per cent to 4,934 per cent. The theoretical daily intake of chlorpyrifos and malathion was now 1,309 per cent and 104 per cent higher.....and for children it got really horrific.

Of the eight pesticides considered, the TMDI of seven pesticides exceeded USEPA fixed safety limits by 114 per cent to 7,118 per cent.

This level of pesticide intake through food (TMDI), allowed by the Indian law, as prescribed under the PFA Act, is truly disastrous. As a rule, globally, MRLs are set in a way that their dietary intakes do not exceed ADI. In India, it seems to be the opposite. Here, out of the eight most commonly used pesticides, the MRLs are set in such a way that the dietary intake for six of them exceeds ADIs as prescribed by JMPR. When compared with the USEPA's safety threshold, the dietary intake of seven out of the eight pesticides exceeds the levels. Therefore, the CSE's estimation of dietary intake of pesticides clearly shows that the current system of regulating pesticides in food commodities has failed miserably.

TOXIC INTAKE I: LESS STRINGENT SAFETY LIMIT

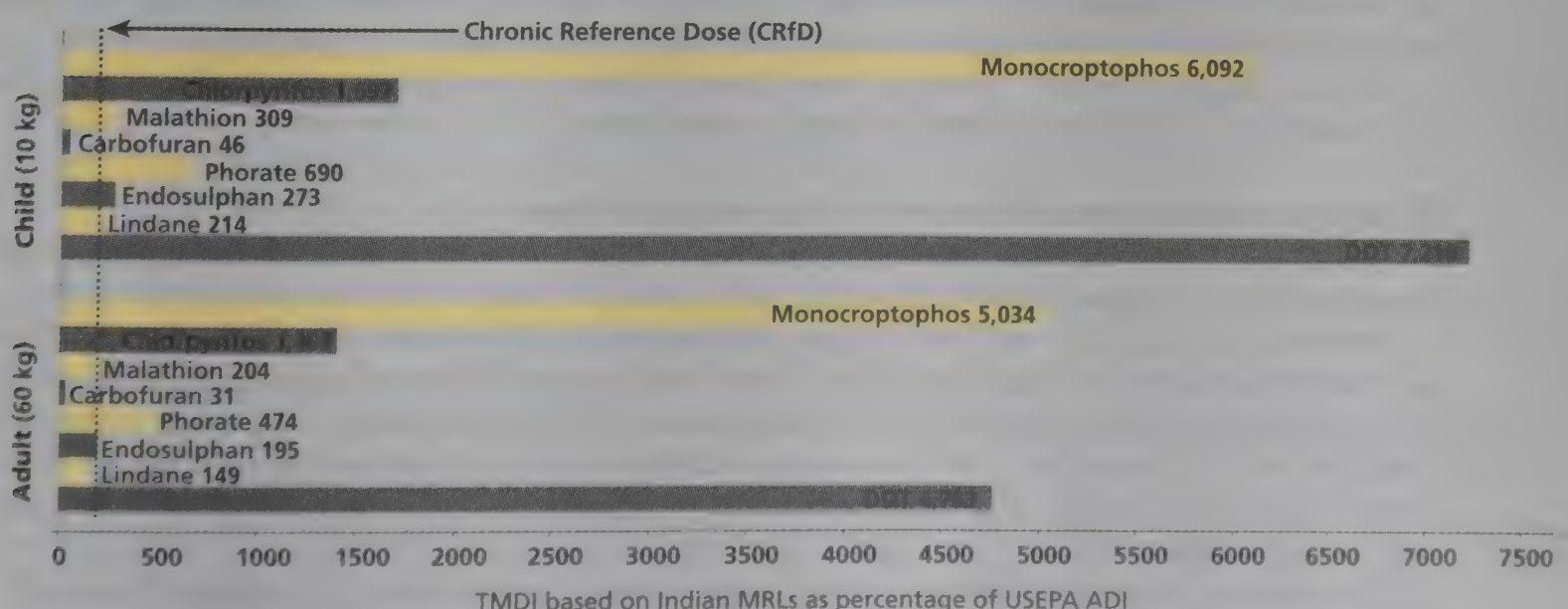
Pesticide intake by adult and child, as compared to ADI fixed by JMPR



Source: Estimated by CSE, based on FAO Food Balance Sheet, dietary data of India Nutrition Profile, 1998 and MRLs prescribed under PFA

TOXIC INTAKE II: MORE STRINGENT SAFETY LIMIT

Pesticide intake by adult and child, as compared to ADI fixed by USEPA



Source: Estimated by CSE, based on FAO Food Balance Sheet, dietary data of India Nutrition Profile, 1998 and MRLs prescribed under PFA

3. CSE's research was to determine the theoretical exposure of pesticides. What is the process through which the actual exposure can be assessed?

Most pro-active governments conduct what are called 'total diet studies' to estimate the actual exposure of pesticides and to reconfirm that pesticide exposure is within safety limits. In the US, the FDA conducts the total diet study to estimate people's actual exposure to pesticides through food. FDA buys food from supermarkets or grocery stores four times a year, once from each of the four geographical regions of the country. Four food baskets, comprising 261 food items, are prepared. These represent over 3,500 different foods reported in the US department of agriculture food consumption surveys (so, for instance, apple pie would represent all fruit pies and fruit pastries). The foods are cooked and then analysed for pesticide residues.

4. Has anyone in India calculated the actual exposure of pesticides?

Till 2000, the Indian government had not conducted any such study. But in a few cases individual researchers have undertaken a total diet study. M P Shukla, Satya Pal Singh, R C Nigam and D D Tiwari — all scientists at the Department of Soil Science and Agricultural Chemistry, C S Azad University of

Agriculture and Technology, Kanpur — had recently undertaken a total diet study. They collected samples of food a person normally eats at breakfast, lunch and dinner, from in and around Kanpur. They then analysed the food for residues of organochlorine pesticides. In the case of endosulfan, DDT and chlordane, the exposures were below the ADI. But for other pesticides, the levels were very high:

- The daily HCH intake in average vegetarian diet exceeded ADI by 110 per cent. In average non-vegetarian diet, this pesticide's intake exceeded ADI by 118 per cent;
- The daily aldrin intake in average vegetarian diet exceeded ADI by 442 per cent; in average non-vegetarian diet, by 1,500 per cent;
- The daily dieldrin intake in average vegetarian diet exceeded ADI by 514 per cent; in average non-vegetarian diet, by as much as 6,000 per cent.

Their results were published in December 2002 in *Pesticide Residue Journal* but as yet, it has done little to shake the apathy of the people in charge.

The AICRPPR study of 2001 too included some sketchy data on the total diet study it undertook. According to this, about 75 per cent of 264 vegetarian diet samples tested were found to contain residues of different pesticides. The presence of DDT and HCH has been reported from most parts of the country. However, 11 per cent samples contained residues of pesticides above their respective ADI values. Similarly, 72

per cent of 243 non-vegetarian diet samples were found to be contaminated mainly with DDT, HCH, endosulfan, chlorpyrifos — 15 per cent of which were above ADI values.

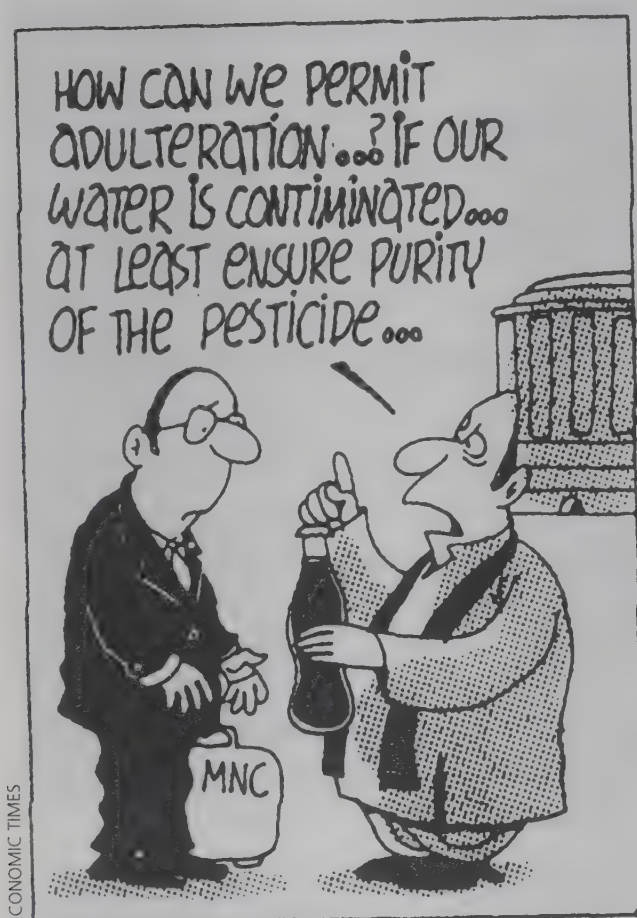
The total diet study results, therefore, validate the CSE finding that Indians are indeed exposed to very high levels of pesticide contamination through food that we eat.

5. What is the government's reaction to these estimations?

The government says very little, actually. It has not disputed the CSE estimation. But it claims that it considers ADI when it fixes the MRL of pesticides.

However, we have found that the methodology used by the government for considering ADI of each pesticide is fundamentally flawed and quite different from globally acceptable principles. For instance, it should be calculated taking into account the food basket and by considering all the crops for which the pesticide has been registered. The government, however, calculates TMDI on the basis of only the new crops for which the pesticide is proposed to be used. Therefore, it ignores the exposure from the existing use of the pesticide.

Then, TMDI should be calculated by using average national diet. However, the diet data (mentioned as food factor in government calculations) used by the government to calculate TMDI is faulty and not in line with the average Indian diet as published by the National Institute of Nutrition (NIN), Hyderabad.



TMDI is the sum total of exposures from all commodities. However, government calculations show that the government uses exposure of the pesticide from individual commodities and compares individual exposures with the ADI. This is then used as a benchmark for fixing MRL of the pesticide on that commodity. This is a scientifically incorrect method, as the total exposure would exceed the ADI.

Government agencies are careless in implementing these standards. For example, while setting standards for the pesticide monocrotophos, the government has considered the pesticide's ADI as 0.006 mg/kg body weight, which is 10 times higher than what JMPR specifies. According to JMPR, the ADI of monocrotophos is 0.0006 mg/kg body weight and, therefore, for a 50-kg adult (average weight of an adult Indian), the Maximum Permissible Intake (MPI) of monocrotophos is 0.03 mg/day. But the government has considered MPI as 0.3 mg/day — which is 10 times higher. This kind of carelessness leads to mistakes, which could end up as nutritional callousness and is contrary to the precautionary principle.



6. What does this mean?

This means that the food we eat is, by and large, unsafe for consumption. Or in other words, regulation is designed to ensure that food is unsafe for humans.

The standards that have been set — the legal limits that determine what is allowed in our food — are too high. These standards, even if enforced, which they are not, will not do very much for ensuring food safety. This is because the legal limit, if applied, will exceed the acceptable daily intake threshold of safety.

It is for this reason that we urgently need a complete revamp of the entire regulatory system so that human health is not compromised.

7. So, should we harmonise our standards with Codex?

No. That would be ridiculous. Government wants to harmonise Indian MRLs with MRLs set under Codex Alimentarius — the FAO-based global food standard agency. We need to harmonise our pesticide policy with our diets, not with Codex.

Once India regulates its pesticides based on its diet and ensures that it is within its acceptable daily intake advisory, then it can argue that diets cannot be harmonised and that its Indian standards have to be accepted as the standards for global trade as well.

8. Should we then allow some pesticides in soft drinks and other processed foods?

This would only be possible, if we had space in our diet-pesticide calculation.

It is clear that living within the ADI quota requires a trade-off between poison and nutrition. What is 'safe' means calculating what we eat, how much we eat and how much pesticide can be allowed in all this. The food basket is also the pesticide basket.

Regulators have to ensure that there is 'space' in the ADI. That our theoretical maximum daily intake — what we are expected to eat in terms of nutrition and pesticides — does not exceed the ADI. But more importantly, that only a proportion of the ADI is used and that more and more accurate dietary-pesticide intake models allow governments to ensure that pesticides are not a health hazard because the exposure is much below ADI.

If exposure is much below ADI, governments can make adjustments for consumption of pesticides through other foods and media — like non-nutritive food or water or even air. You can ingest some 'unaccounted for' pesticides through non-essential food, which is not part of the daily diet-pesticide calculation.

Currently, we exceed the ADI because we have set very high MRLs. Because we exceed the ADI, we have no space for non-essential food. Remember, pesticide regulation is about the nutrition-poison trade-off. If our daily diet of pesticides is being exceeded only with essential food, we cannot allow pesticides in non-essential and non-nutritive foods. This is why we cannot allow pesticides in Coke or Pepsi.

But also, we will need to enforce the legal limits through an effective programme of surveillance and enforcement. We cannot argue that we cannot control pesticide contamination on our raw agricultural commodities and so cannot enforce standards for food safety. This is unacceptable and wrong.

Finally, we have to remember that regulation will cost. Every time, we register a pesticide for use we will have to incorporate this cost — of regulation and enforcement. Otherwise, we are discounting the real costs — of ill health and death. This is a deliberate policy of negligence. Criminal negligence.

E. What should we do to make our food safe to eat?

To start with, India needs to do fundamental changes in the way it registers pesticides and regulates and monitors pesticide contamination.

1. There is no mandatory provision under the Insecticides Act that makes sure that the tolerance limits on food commodities (MRLs) is set at the time of the registration of the pesticide. This is in contrast to the process followed by countries like US, EU or Australia. For instance, in the US, pesticides are registered by the EPA for use in food or feed crops only if a tolerance (or an exemption from a tolerance) is first granted, under authority of sections 408 and/or 409 of the Federal Food, Drug and Cosmetic Act (FDCA). This makes sure the pesticide contamination of food commodities is monitored and enforced from the day a pesticide is allowed to be used. In India, currently, more than 60 per cent of registered pesticides have no MRLs or standards on food commodities. India will have to modify its registration process in such a way that no pesticide is registered for use unless its tolerance limits on various food commodities is fixed, so that monitoring and enforcement of MRLs is done immediately. This can be done with the following changes:

- The pesticide registering authority and the authority setting the pesticide standards for food commodities should be the same. The same authority should also establish the ADI for the pesticide.
- At the time of registration of pesticides, the ADI and the MRLs on all the food commodities should be established. The registration should not be done if the MRLs and ADI are not fixed.

2. Globally, ADI is the touchstone of pesticide risk management and for setting pesticide standards for food commodities. In India, ADI plays no role in setting pesticide standards for food commodities. The

result is that the pesticide intake allowed by law in the country exceeds ADIs for most pesticides. This needs to be changed completely. The MRLs should be established in such a way that the dietary intake of the pesticide does not exceeds the ADI. ADI must become the cornerstone of all decision taken regarding the use of pesticides.

3. The enforcement of pesticide standards on food commodities under the PFA is almost non-existent in the country. Regulators (Food and drug administration of state governments and labs under the PFA), who are supposed to enforce the MRLs prescribed under PFA, seldom monitor the pesticide residues in food commodities. And the agency involved in monitoring the pesticide residues on food commodities (All India Coordinated Research Project on Pesticide Residues under the Indian Agricultural Research Institute) is not the regulator. This has resulted in gross violation of standards set for pesticide residues in food commodities under the PFA, 1955. India will have to develop a strict monitoring and enforcement mechanism to make sure that the pesticide levels in food commodities remains well below their MRLs. There should be a separate authority to regulate the pesticide MRLs as prescribed under the PFA. In addition, the data collected by the All India Coordinated Project on Pesticide Residues must be used for enforcement. Otherwise, this project serves no purpose.



5. Pesticides once registered in India remain registered even if large scale ill-effects are observed due to use. India will have to start the process of granting registration for only a limited period and thereon the pesticide should be re-evaluated based on latest scientific data, before being re-registered. This will ensure that problematic pesticides are quickly phased out before causing large-scale damage.

6. India will have to do away with the old toxic and persistent pesticides and register only those that are less toxic than the previous ones. This process of registration, called 'comparative risk assessment' is becoming popular across the world and is sure-shot way to reduce the toxicity of pesticides used in the country. The country will have to invest in R&D to develop less toxic pesticides.

7. We can only ensure less pesticide intake in the food we eat by regulating the pesticide use at the farm level. This we cannot do only by educating individual farmers, which so far the country has been trying to do unsuccessfully. To make it happen, we will have to regulate the supply chain of the pesticide companies. We will have to make sure that the pesticide companies sell their products in a responsible

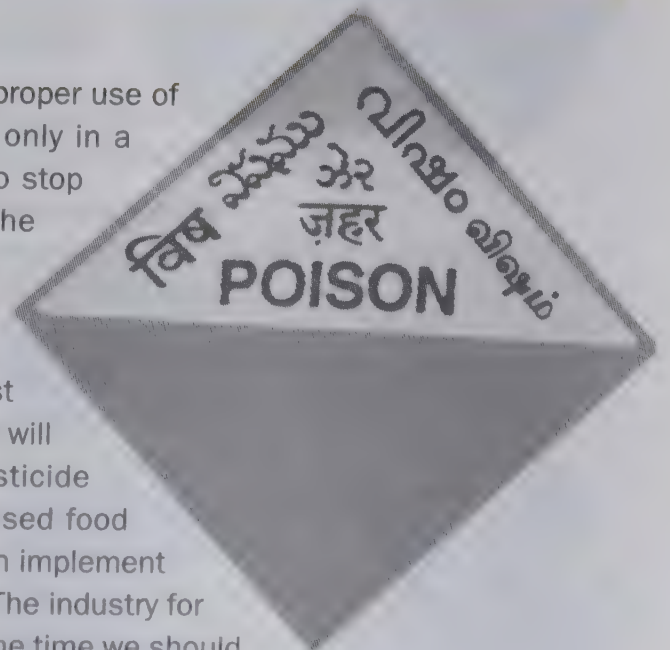
WHAT WE NEED TO DO

Time is running out... India needs to get its act together. And fast.

Process/Institutions	India	USA and other developed countries	Recommendations
Registration of pesticides	The Registration Committee (RC) constituted under Section 5 of the Insecticides Act, ministry of agriculture	US Environment Protection Agency (USEPA)	Pesticides must be registered based on the toxicity — acute and chronic. We should register pesticides with lower toxicity and persistence than what is already registered. We must review all data on toxicity — in USEPA/JMPR/Australia standards — so that we can adopt the most stringent ADI calculations. Data on the toxicity and basis of registration should be available publicly.
Setting of ADI of pesticides	None	US Environment Protection Agency (USEPA)	Must set ADI at the time of registration. Has to be done in consultation with health ministry and health experts.
Setting of MRLs on food commodities	Central Committee of Food Standards (CCFS) under ministry of health and family welfare	US Environment Protection Agency (USEPA)	Must set MRLs at the time of registration for all recommended commodities. Must cross-check that the recommended MRL does not exceed the ADI. Must set MRLs for processed foods in the essential diet.
Enforcement of MRLs on food commodities	Enforcement of the MRLs under the PFA, 1955, is the responsibility of the food inspectors of the state governments (food and drug administration or equivalent) and the four Central Food Laboratories, established under the PFA.	US Food and Drug Administration (USFDA), both for domestic as well as imported food items.	Enforcement must be made much more dynamic. Data available under the All Indian Coordinated Research Project of IARI must be used to enforce standards.
Re-registration of pesticides	Not done	Done periodically. Is part of law.	Must re-register pesticides. This process has to be paid for by the industry and allows for constant review and reassessment.

manner. They will have to sell their product only when they are sure of the proper use of the product (product stewardship). They will have to sell their product only in a quantity that is required and that too directly to the user. They will have to stop distributing their products to small shops. It is only by regulating the pesticide supply that we can reduce our pesticide intake through loose agricultural products.

8. Regulating processed food commodities is the most effective way by which we can reduce our pesticide intake in the shortest possible time. Most of the processed foods are branded products and, therefore, the companies will have to make sure that their products are meeting the required pesticide standards. To do this, we will have to develop pesticide MRLs for processed food commodities based on sound scientific and health-based principals and then implement them strictly. This is the only route left to us to reduce our pesticide intake. The industry for processed foods is only just beginning to grow and therefore, this is exactly the time we should set the principles that help the industry grow in the future.



F. Breaking the circle of poison with new chemicals

1. Who will bear the cost of regulation?

The more chemicals we register, higher is the cost. This is because governments have to invest in costs of surveillance, residue analysis or enforcement. Can we afford this cost? Who will pay? In USA, managing pesticide risks cost 7.4 per cent of gross pesticide sale between 1971-95. We cannot say that we are poor to enforce health regulations once we have allowed use of a substance. Regulation has to be part of the use (registration) process. In the US, the pesticide industry is required by law to pay for the costs of re-registration. Why should we not ask industry for a cess to pay for enforcement of standards?

2. Should we ban pesticides or regulate them?

The nature of the business is that a toxic substance is replaced with another, even more lethal substance. This is exactly how global business works. So, if DDT is found to be noxious, companies find it much more profitable to 'substitute' it with an alternative. In 1972, DDT was found to be persistent. It was banned in the US. Industry then introduced alternatives: methoxychlor and dicofol, which were relatively close to DDT, and endosulfan. But as persistence was still a problem, a new pesticide-type was introduced: organophosphates. These pesticides have higher acute toxicity. They reduce the ability of the enzyme cholinesterase to regulate signals between neurons and can cause muscle weakness.

By the 1990s, concern for children's health grew in the industrial world. Scientists found that these new chemicals are less persistent but more toxic. Organophosphates were indicted for childhood developmental problems. By 2000, the US asked for a review of organophosphates. It considers introducing a "common mechanism of toxicity", which will be able to better manage risks from cumulative toxic effects. It also plans to review 9,728 MRLs by August 2006.

3. How do we break the circle of poison?

It could be argued that business is profitable only when it searches for new solutions for old problems. This toxic tango is deadly for our health and the environment. But it also defies the logic of progress. It is for this reason that we desperately need a global compact on product impact assessment and liability. The problem today is that the global ecological framework does not penalise the producer when their products are found dangerous or toxic. Instead, the global system actually rewards the producer by providing yet another lucrative market for its substitutes.

International agreements — such as the Stockholm Convention on Persistent Organic Pollutants and the Rotterdam Convention on Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade — do not even begin to address the principle of liability and compensation — or, in other words, holding the polluters liable to pay damages. Therefore, if inventors get incentives through the intellectual property systems, the inventors whose products are found to have adverse impacts should also stand to lose. There should be a global liability on each product.

This will force companies to do careful assessment and maybe create incentives for environment-friendly products.



4. What needs to be done?

The chain needs to be broken.

It is impossible to know everything about the product when it is introduced. After all the tests and innovation, much more is left unknown, than known. The one option, and important one, is to invest in science for ecological security, to be able to stay ahead of the environmental surprises of these products. Environmental assessment of products and not just projects must be made mandatory and more stringent.

But much more important is to find ways of jumping ahead — to break the cycle — and to invent and innovate in products that meet and beat the toxicity treadmill. But for this new generation of products, industry will need less greed and more foresight.

It will need the stick of regulation. One key issue is to build a strong liability regime so that the manufacturer is warned of the precautions needed to invent products that could be profitable in the short-run and toxic in the long-run. This liability regime will force manufacturers to take life-time responsibility and invest in sustainability.

9

No right to clean water

There are no legal standards that define what the quality of water is that is safe for Indians to consume



What the JPC says:

"Since there is enough scientific data to prove that most of the serious diseases and deaths particularly in rural areas, are caused due to the unsafe drinking water, it is the primary duty of the State to make safe drinking water available to the people. The Committee find that BIS is revising the standards for drinking water and has recommended the same standards for drinking water as are now applicable in the case of packaged drinking water. Though these standards are only voluntary, the Committee wonder as to what is the scientific basis for adopting such standards, particularly when there are hardly any state-of-the-art laboratories of BIS which are presently equipped to test pesticide residues in water. The Committee are of the considered view that norms for drinking water should be formulated based on scientific studies and should be such which are achievable. It is at the same time very essential that these standards are made legally enforceable. Earnest efforts in this regard must be initiated immediately."

— Report of Joint Committee on Pesticide Residues in and Safety Standards for Soft Drinks, Fruit Juice and other Beverages, Chapter IV, Conclusion/Recommendation 4.55

1. Why is clean drinking water so important?

Dirty water is the second largest cause of death in India. The public health implications of unclean water are enormous. On the one hand, water scarcity is growing; on the other, water is getting increasingly polluted, which hikes up its cost of treatment or leads to more deaths and illnesses. Clean water is a top priority for the country in terms of public health imperatives.

2. Who defines what is 'clean' water? Who sets the standards for water quality?

We must realise that Indians do not have a 'legal' right to clean water in the country. This is because the standards that define what is 'potable' or 'wholesome' or 'safe' water — all of these are terms scattered confusingly in different sets of water quality-related norms — are only guidelines, which are not legally enunciated.

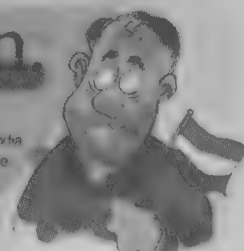
The quality of drinking water falls under the purview of the Union ministry of urban development and poverty alleviation. Under it, the Central Public Health and Environmental Engineering Organisation sets guidelines for the quality. Local bodies such as municipalities are 'expected' to follow these guidelines. The Bureau of Indian Standards (BIS) has also set drinking water standards — IS 10500:1991. However, these standards are voluntary, in nature. Currently BIS is reviewing its drinking water standards in the light of the JPC recommendations.

3. Why are there no legal standards for water?

The Prevention of Food Adulteration (PFA) Act was enacted in 1954. The Union ministry of health and family welfare is its implementing agency. When the Act was notified, water was not covered under it as 'food'. It defined food under section 2 (v) as "any article used as food or drink for human consumption other than drugs and water".

Drink Indian,
Breathe Indian,
Die Indian.

This message is sponsored by the Government of India to commemorate 50 years of Indian independence.



THE 'RIGHT TO WATER'

The Allahabad High Court...

- in 1998, ruled that right to get water is part of the right to life guaranteed by Article 21 of the Constitution, while recognising that a large section of citizens of the city are being deprived of this right
- in separate verdicts in 2000 and 2001 again made clear that as no one can conceive survival without water, citizens are justified in demanding proper water supply and ensuring supply of water is a constitutional mandate

In 1998, in the context of scarcity of potable water in Guwahati city, the High Court said that water, and clean water, is essential for life and attracts provision of Article 21. It further advised the Guwahati Municipal Corporation that "before making huge projects of hundreds of crores of rupees and approaching different bodies and governments including Japan, France and the World Bank, some genuine efforts should have been made by the government itself or the state government to mitigate the malady".

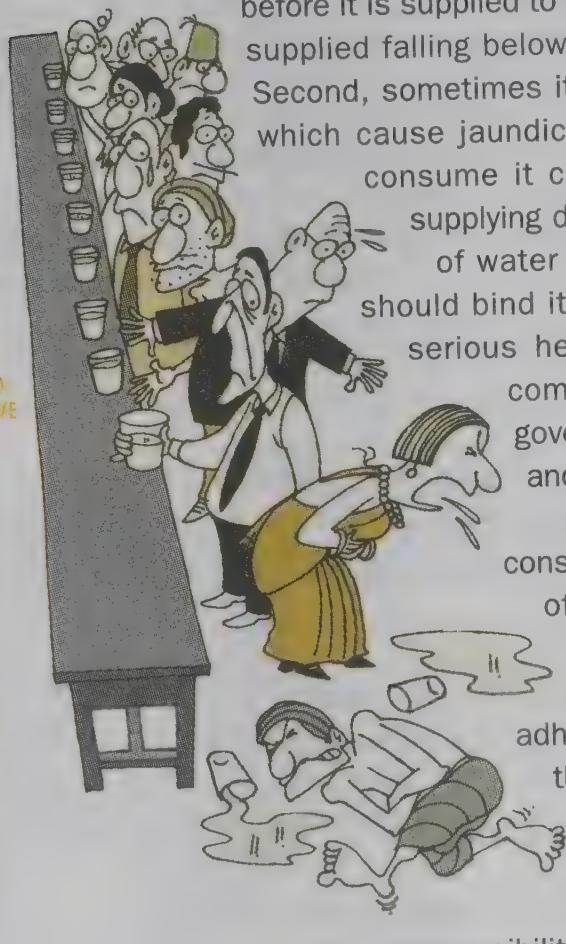
In 2000, the Madhya Pradesh High Court maintained that supply of pure drinking water is the statutory duty of the municipal corporation and the supply of such water has to be ensured to every citizen (Ramji Patel versus Nagarik Upbhokta Marg Darshak Manch).

In 1996, the Committee on Subordinate Legislation proposed that water should also be included in the Act as a food item. The *Fifth Report of Committee on Subordinate Legislation (Eleventh Lok Sabha)* published in 1997 put it thus: "One, water is treated and purified by the local authority before it is supplied to the public. Thus there is always a possibility of the purity of water supplied falling below the prescribed standard, which renders it injurious to health. Second, sometimes it is found that the water supplied contains viruses or bacteria, which cause jaundice, typhoid and other water-borne diseases, and people who consume it contract such diseases. Whichever agency is responsible for supplying drinking water to the public has responsibility to ensure the purity of water so supplied and the committee strongly feel that the statute should bind it to do so. Otherwise the whole population will be exposed to serious health hazards, with no one owing responsibility for it." This committee recommended that immediate steps be taken by the government to amend section 2 (v) of the Act, to include water treated and supplied by local authorities within the definition of 'food'.

But the Union ministry of health and family welfare, after consideration, rejected this recommendation. It replied: "The widening of the definition of food to include water will bring it under the Prevention of Food Adulteration Rules and consequently, would impose a legal commitment and obligation on the agencies for adhering to the recognised standards for potable water supplied by them. As you are aware, drinking water in urban and rural areas is generally supplied only by the state government undertakings or local bodies. The burden of this commitment will fall, therefore, on these agencies and more than the urban local bodies the responsibility will be greater in the case of rural local bodies where the required standards have not yet been reached and who are also facing financial crunch."

SHOULD WE IMPROVE
OUR DRINKING WATER
QUALITY?

NO...BUT WE MUST DO
SOMETHING TO IMPROVE
THEIR IMMUNITY...



4. But Indians do have the 'right to life' guaranteed under the Constitution. Is the right to clean water not included in this provision?

Orders of different courts of the country have interpreted the right to life also as the 'right to water'. For instance, in 2002, the Andhra Pradesh High Court reiterated that the right to "safe drinking water is a fundamental need" and "it cannot be denied to citizens even on the ground of paucity of funds". Therefore, the 'right' has been established (see box: *The 'right to water'*). The question now is to establish how much water is each Indian entitled to and how clean this water must be.

5. But are municipalities not responsible for the supply of clean water?

Various municipal laws include the need to supply water to their citizens. But these laws invariably leave large escape routes. According to section 234 of the Calcutta Municipal Corporation Act, 1980, it is the

corporation's duty to supply wholesome drinking water to consumers. The Act also says that the municipality should take steps to provide, *as far as possible*, a supply of wholesome water. It further adds that the corporation shall, *paying regard to available resources*, provide civic services including water supply.

The Rajasthan Water Supply and Sewerage Corporation Act, 1979 goes a step further. It makes no explicit mention of the corporation's duty to supply water to the consumer. Under section 42 of the Act, the department is absolved of not supplying water when there's an accident, such as electric power supply failure or leakage or burst main pipes or obstruction or low pressure in the mains in summer, or a labour strike. The department retains the right to suspend water supply at any time and for as long as may be found necessary for repairs or for laying new lines.

The Delhi Municipal Corporation Act, 1957 says that steps should be taken to provide, *as far as possible*, a supply of wholesome water. The Act also says that when it is not practicable to provide such supply at a *reasonable cost*, water must be made available at a *reasonable distance* from every house.

The Tripura Municipal Act, 1994 says that every municipality shall either itself or through any agency (including a government department) *try to supply* water for the use of the inhabitants. The Act leaves it to the municipality to decide the standard and quality of water that is to be supplied for domestic or non-domestic use.

6. But will regulating the quality of water be much too expensive for municipalities? Can we really afford clean water?

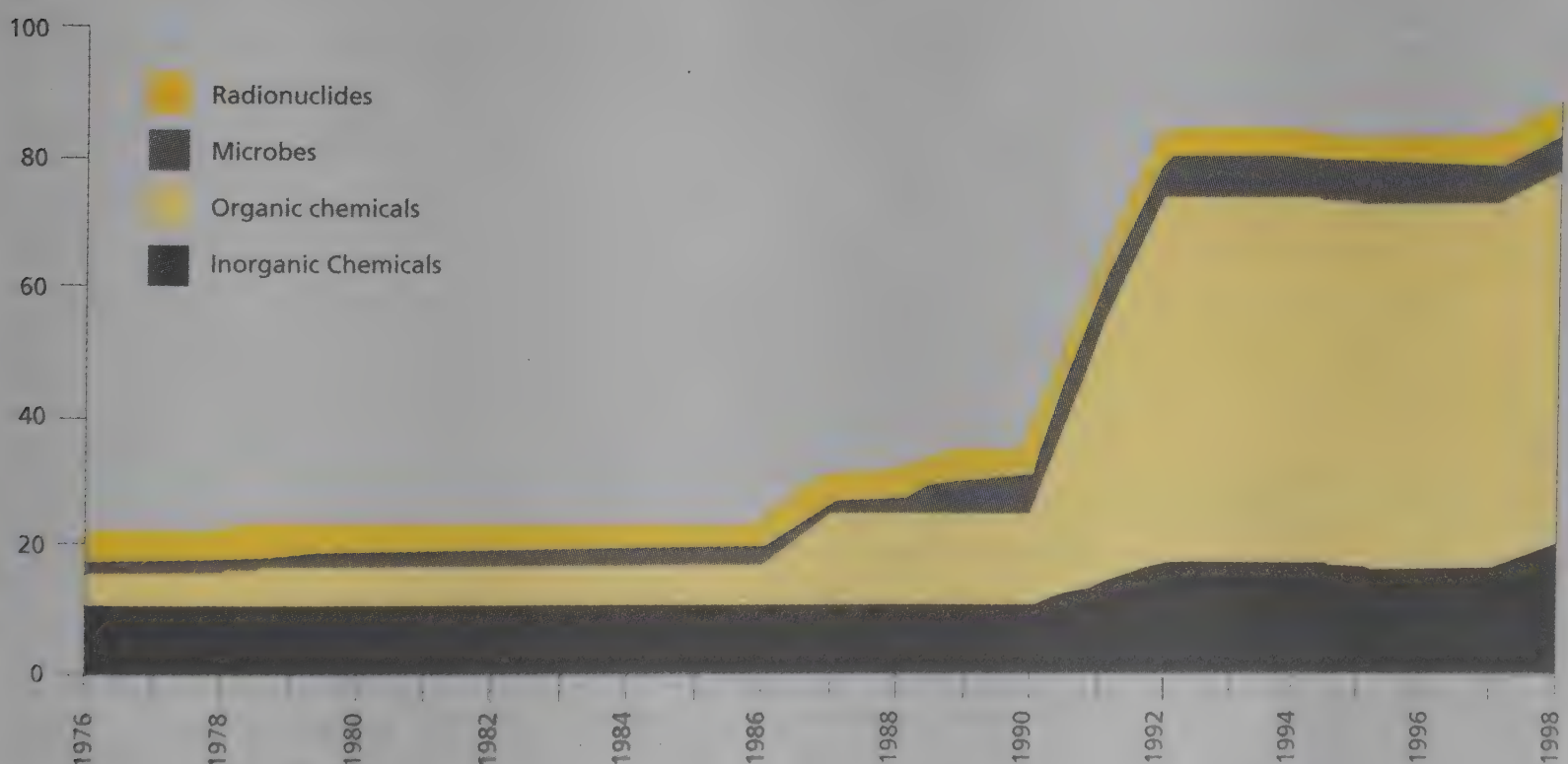
The question that is more important to ask is, if we can really afford not to regulate water. We need regulation to firstly ensure that the source water is not contaminated further and secondly, to ensure that the enormous health burden of dirty water is avoided.

The cost of cleaning up is important to consider, but it is equally important to consider how stringent, legally enforceable standards could enable agencies to look seriously at the cost-effectiveness of avoiding and minimising pollution. After all, increased pollution and contamination will add to the cost burden of cleaning water.

Also, as happens in other parts of the world, we could begin by regulating key contaminants and then add to the list and the cost. For instance, in the US, the 1974 Safe Drinking Water Act (SDWA) is the principle law governing drinking water safety, and over the years a number of contaminants have been added for regulation under this Act (see graph: *Regulating pestilence*, and box: *The US experience*).

REGULATING PESTILENCE

Number of contaminants regulated under the US' Safe Drinking Water Act, by contaminant type



Source: Frederick W Pontius, 'Drinking water regulation and health', Wiley Interscience, 2003.

THE US EXPERIENCE

In the US, drinking water standards were not legally binding until the country enacted the Safe Drinking Water Act (SDWA) in 1974. This Act establishes a cooperative programme among local-state and federal agencies. These regulations were the first to apply to all public water systems in the US, covering both chemical and microbial contaminants. The Act provided the framework for agencies to take responsibility for standard-setting, surveillance and enforcement.

- The Federal government, specifically the US Environment Protection Agency (EPA), was authorised to set national drinking water regulations, conduct special studies and research and oversee implementation of the Act.
- The state governments through their health departments and environmental agencies, are expected to administer and enforce the regulations set by USEPA under the Act
- Public water suppliers have the day-to-day responsibility of meeting the regulations

This Act requires EPA to regulate contaminants that present health risks and are known to, or are likely to, occur in public drinking water supplies. For each contaminant the EPA sets a legal limit on the amount of the contaminant allowed in drinking water. These are considered minimum standards and states can set even tighter regulations based on their specific conditions. Since 1974, the number of contaminants regulated under SDWA has quadrupled.

To strengthen, especially the regulation-setting process and groundwater protection, the Act was amended in 1986 and then amended again in 1996, to establish the Drinking Water State Revolving Fund (DWSRF) to make funds available to drinking water systems to finance infrastructure improvements. These amendments require the water supply systems to adopt Point-of-Use and Point-of-Entry treatment to achieve compliance with the national primary drinking water regulations. In other words, the quality standards for water are set at the treatment plant and then again at the household tap.

However, the problem with this approach is that it often increases the cost of cleaning up, for technology has to be upgraded to clean the new contaminants on the list. Therefore, we need a composite approach, which does the following:

- Encourages and stipulates protection of source water from further contamination
- Sets a technology roadmap for cleaning water quality
- Benchmarks standards that need to be introduced, and
- Sets a schedule by which the standards are progressively tightened.

The existing guidelines for the quality of drinking water should become the basis of the legal standards (see table: *Drinking water standards*).

7. What does technology to clean water cost?

Currently most municipalities in India use, at the most, conventional water treatment which involves screening, pre-chlorination, clariflocculation, filtration and disinfection (using chlorine). This technology can remove conventional microbacteriological contaminants, but fails to deal with the 'modern' contaminants of the modern industrial world — heavy metals and pesticides. These require sophisticated and, therefore, more expensive technologies — granular activated carbon, membrane process and ozonation (see table: *Treatment technologies*).

There is no compiled information on the cost of water treatment in different municipalities of India. But assuming costs that are taken from different sources, the cost of capital investment in water treatment would be between Rs 11-15 lakh per million litres per day, in case of conventional treatment plants based on clariflocculation, sedimentation and filtration. Assuming that each person requires 50-60 litres per day, the 1 million litres would serve 20,000 people each day. On dividing the capital cost per head, it would mean each person would pay between Rs 55 to 75 for this capital investment.

In the case of an advanced system — for instance, the new plant being built at Sonia Vihar in Delhi, which uses a sort of high pressure filtration system — the capital cost works out to Rs 30 lakh per million litres daily (mld). Therefore, the per head cost would also double and reach somewhere between Rs 150 per person served.

In addition, there are costs of distributing water, salary costs and operation and maintenance costs. On an average, it can be estimated that these costs are between Rs 6-23 per 1,000 litres (1 kilolitre, kl) in different cities. For instance, in Delhi, the cost is roughly Rs 5-8 per 1,000 litres, which includes 42 per cent salary and establishment costs, 45 per cent electricity costs and the rest for chemicals. This cost does not include the preventive maintenance that is required to ensure that the system stays serviced.

DRINKING WATER STANDARDS

Set by different agencies

Parameters	Units	IS 10500: 1991 ¹		CPHEEO (1999) ²		WHO third edition ³
		Desirable limit	Permissible limit (in the absence of alternate source)	Acceptable	Cause for rejection	Guideline value
Microbiological quality						
Faecal coliform (or thermotolerant coliform)	MPN/100 ml	Zero	—	Must not be detectable in any 100 ml sample	—	Must not be detectable in any 100 ml sample
E. Coli	MPN/100 ml	Zero	—	—do—	—	—do—
Total coliforms	MPN/100 ml	No sample, in distribution system including consumers premises, should contain 10 coliform organisms per 100 ml	—	—do—	—	—do—
Heavy Metals						
Arsenic	mg/l	0.05	No relaxation	0.01	0.05	0.01 (P)
Cadmium	mg/l	0.01	No relaxation	0.01	0.01	0.003
Chromium (total)	mg/l	0.05	No relaxation	0.05	0.05 (as hexavalent chromium)	0.05 (P)
Copper	mg/l	0.05 (as Cu)	1.5	0.05	1.5	2 (P)
Iron	mg/l	0.3	1	0.1	1	No standards
Lead	mg/l	0.05	No relaxation	0.05	0.05	0.01
Mercury (inorganic)	mg/l	0.001	No relaxation	0.001	0.001	0.001 (total mercury-organic + inorganic)
Manganese	mg/l	0.1	0.3	0.05	0.5	0.4 (C)
Nickel	mg/l	No standards	—	No standards	—	0.02 (P)
Selenium	mg/l	0.01	No relaxation	0.01	0.01	0.01
Silver	mg/l	No standards	—	No standards	—	No standards
Tin (inorganic)	mg/l	No standards	—	No standards	—	No standards
Thallium	mg/l	No standards	—	No standards	—	No standards
Zinc	mg/l	5	15	5	15	No standards
Other inorganic compounds						
Aluminium	mg/l	0.03	0.2	0.03	0.2	No standards
Chloride	mg/l	250	1,000	200	1,000	No standards
Cyanide	mg/l	0.05	No relaxation	0.05	0.05	0.07
Fluoride	mg/l	1	1.5	1	1.5	1.5
Nitrate	mg/l	45 (as NO ₃)	100	45	45	50 (as NO ₃) for short term exposure
Nitrite	mg/l	No standards	—	No standards	—	3 (as NO ₂) for short term exposure; 0.2 (P) for long term exposure
Pesticides	mg/l	Absent	0.001	Absent	Refer WHO guidelines	Different values for different pesticides; Set guide values for 35 pesticides; Values range from 0.0003 for lindane to 0.03 for chlorpyrifos
Radioactive materials						
a) Alpha emitters	Bq/l	—	0.1	0.1	—	0.1*
b) Beta emitters	pci/l	—	1	1 Bq/l	—	1 Bq/l*
Organic parameters						
Phenolic compounds (as C ₆ H ₅ OH)	mg/l	0.001	0.002	0.001	0.002	No standards
Polynuclear aromatic hydrocarbons (as PAH)	mg/l	—	—	0.0002 (all PAH)	0.0002	0.0007 (Benzo[a]pyrene (PAH))
Mineral oils	mg/l	0.01	0.03	0.01	0.03	No standards
Physical parameters						
Total dissolved solids (TDS)	mg/l	500	2,000	500	2,000	No health based values
Total hardness (as CaCO ₃)	mg/l	300	600	200	600	—do—
Colour	As specified	5 (Hazen units)	15	5	25 (platinum cobalt scale)	—do—

Notes: mg/l — milligrams per litre Bq/l — becquerel per litre pci/l — pico curie per litre MPN — Most Probable Number ml — millilitre

*WHO guidelines desire that if the values for gross alpha and beta activity are exceeded then the individual radionuclides need to be tested; P — evidence of potential health hazard is limited; C — concentrations of the substance at or below the health based guideline value may affect the acceptability

Source: 1. IS 10500: 1991, Drinking water standards, Bureau of Indian Standards, 1991, 2. Manual on water supply and treatment, Central Public Health and Environmental Engineering Organisation (CPHEEO), Ministry of Urban Development, New Delhi 1999, pp 14-16, 3. Guidelines for Drinking Water Quality, Third Edition, World Health Organisation (WHO), Geneva as downloaded from http://www.who.int/dorstore/water_sanitation_health/GDWQ/Updating/draftguidel/draftchap81.htm on October 22, 2003

8. What is the cost of modern water treatment technology?

Four types of membranes — microfiltration, ultrafiltration, nanofiltration, and reverse osmosis — are used to filter out impurities. Microfiltration is a low-pressure process for separating colloidal and suspended particles in the range of 0.05-10 microns. Ultrafiltration uses pressure of up to 145 pound per square inch. It concentrates on suspended solids and solutes of molecular weight greater than 1,000. Nanofiltration uses membranes with pores close to one nanometer in diameter, and is used for desalination and

removing minerals and colours. Reverse osmosis (RO) is a technique for concentrating/ separating low molecular weight substances. It can concentrate all dissolved and suspended solids.

Activated carbon is an amorphous material, which is highly porous and has a large inter-particulate surface area that gives it high adsorption capacity and surface reactivity. It is made by thermal decomposition, partial combustion and combustion of various carbonaceous material such as wood, coal, nut shell, peat and lignite. Capital cost of this technology, which can treat chemical contaminants, would be Rs 25 lakh per mld and the operation and maintenance cost would be, on an average, Rs 3.25 per kl.

So for a 100 mld plant (which would service 20 lakh people at 50 litres per day), the cost would be roughly Rs 25 crore. But as this plant requires pre-treatment, that is water that has already been treated through conventional treatment, the cost would be substantially higher.

The data for large plants based on reverse osmosis technology does not exist. The capital cost for a 100,000 litre per day plant is roughly Rs 6 lakh and the operation and maintenance cost is between Rs 2-3 per 1000 litres.

But in a smaller plant (24,000 litres per day), the capital cost would be Rs 3-4 lakhs and the operation costs could go up to Rs 7-10 per 1,000 litres (still only 0.7 paise per litre). The major concern with RO-based plants is the wastage of water that happens during the process.

If we compare these water treatment costs to the cost we pay for one bottle of branded water, the costs are nominal. Even using RO, it costs only 0.7 paise per litre for the treatment costs of a bottle that costs Rs 10 to the consumer for that litre (see also table: *Treatment by RO*).

TREATMENT TECHNOLOGIES

Treating water and the costs thereof

Ranking	Treatment process ¹	Cost per kilolitre of water treated ²
1	Simple chlorination Plain filtration	Not available Not available
2	Pre-chlorination plus filtration Aeration	Not available Rs 1.88-7.21 per kilolitre
3	Chemical coagulation Process optimisation for control of disinfection by products	Not available Not available
4	Granular activated carbon Ion exchange	Rs 1.78-15.35 Rs 4.21-5.42
5	Ozonation	Rs 0.89-1.75
6	Advanced oxidation process Membrane treatment	Rs 3.76 Rs 5.01-45.43 (reverse osmosis)

Source:
1. Guidelines for Drinking Water Quality, 3rd Edition, World Health Organisation, Geneva as downloaded from http://www.who.int/docstore/water_sanitation_health/GDWQ/Updating/draftguidel/draftchap81.htm on October 22, 2003
2. http://www.modestogov.com/omd/01_ccr/pdf/phg_cost_treat.pdf as viewed on October 16, 2003.

TREATMENT BY RO

Cost of reverse osmosis-based decentralised (community level or household) water treatment units

Agency/project	Technology used	Capital cost (Rs lakh)	Capital cost (Rs lakhs per mld)	Operation and maintenance costs (Rs/1000 litres)
Ion Exchange Limited, New Delhi Size: 1 kilolitre per hour (24 KLD)	Reverse osmosis	3-4 lakhs	167.00	10
Fontus Water Limited, New Delhi Size: 1 kilolitre per hour (24 KLD)	Reverse osmosis	3-3.5	145.83	7-8
Thermax India limited, New Delhi Size: 4-5 kilolitre per hour (100 KLD)	Reverse osmosis	6 lakhs	60	2-3

Source: 1. Deeraj Koli, Ion Exchange (India) Limited, New Delhi, Personal Communications, November 12, 2003.
2. Ajit Singh, manager-projects, Fontus Water Limited, New Delhi, Personal Communications, November 12, 2003
3. Surindher Sharma, deputy manager, Thermax India Limited, New Delhi, Personal Communication, November 14, 2003.

9. What is the economics of water in our cities?

Most cities don't charge for water and don't invest in water services either. Take the economics of one of the most pampered cities in India, Delhi. The Delhi Jal Board makes an annual loss of Rs 240 crore on just its regular salary and maintenance bill. Forget what it has to invest for capital costs for drinking water treatment and sewage treatment. If the annual capital costs are taken into account, the city recovers just about 20 per cent of its total annual budget from consumers.

The economics of the Delhi Jal Board:

Annual budget for salary, electricity and other costs: Rs 500 crore

Annual capital budget: Rs 713 crore

Total recovery: Rs 260 crore

But if one takes just the annual salary and distribution costs and wants to ensure full recovery, then the agency would need to charge each consumer Rs 4.7 per 1,000 litres for the water it supplies. This is assuming that the city supplies 2,900 million litres of water per day, which costs it Rs 500 crore in annual establishment costs.

The major costs in cities today is the cost of water transportation and distribution. In Hyderabad, the new water supply project which will bring water from river Krishna to the city will cost Rs 23 per 1,000 litres, because of the high electricity costs of pumping and transporting the water.



BASIC MINIMUM WATER RESERVED FOR ALL IN SOUTH AFRICA

Thulisile Christina Mangele was an unemployed mother of seven, whose water supply had been disconnected as a result of the non-payment of her water account. In 2002, she filed a case against the Durban Transitional Metropolitan Council in 2002. (*Mangele v Durban Transitional Metropolitan Council in South Africa, Durban High Court, 2002 (6) SA 423 (D)*).

Mangele wanted a direction that the discontinuation of the water supply was unlawful and invalid, under the terms of the Water Services Act of 1997, for the disconnection had resulted in her and her children being denied access to basic water services when she was unable to pay for the services.

The South African Water Services Act 108 (1997) refers to the right to a basic water supply, defining this as "the prescribed minimum standard of water supply services necessary for the reliable supply of a sufficient quantity and quality of water to households, including informal households, to support life and personal hygiene". It defines "prescribed" as "prescribed by regulation".

But there was no quantified right to water. The water utility — Durban Transitional Metropolitan Council — then adopted a policy of providing the first 6000 litres of water per month free to domestic consumers. But then, it went back to tell Mangele that as her water consumption had, without her knowledge, far exceeded the free right provided by the respondent, her connection would be disconnected.

Nevertheless, Mangele created an important precedent, which can well become a lesson for all countries.

In April 2002, South Africa issued a law giving all every household 6,000 litres per month free of charge as a compulsory standard or right. The quantity of free water, as the basic minimum, was based on either 25 litres per person per day or 6,000 litres per household per month (equivalent to 25 litres per person per day for a household of eight people). Beyond this "free water right" the government and its water utility charge for water at differing rates.

The "Guidelines for compulsory national standards and norms and standards for water services tariffs" define basic minimum standard of water supply as a given quantity of water delivered within 200 metres of a household at a minimum flow rate of 10 litres per minute.

The guidelines observes: "the reason for the household based volume is that it is often more practical for water services institutions to count the number of households to be served rather than the actual number of individuals. 25 litres per person per day is a provision for communal standpipes and 6000 litres for yard connections. Although eight people were used for 6000 litres, this remains the limit irrespective of the number of people in a household except in cases where the municipality decides to provide a higher amount".

Most importantly this regulation also recognises that reliability of water supply also forms part of the basic minimum standard. This is addressed by the requirement that no consumer is denied access to basic water supply for more than seven full days in any year. In case of both planned and unforeseen interruptions the water utility is supposed to maintain a minimum supply of 10 litres per person per day, through the use of alternative sources.

10. What do we pay for water?

In Delhi, the charges are ridiculously low: Re 0.35 per 1,000 litres. Just compare this to what we pay for one litre of bottle water: Rs 10.

In other cities, the cost varies between Rs 2.25 per 1,000 litres to Rs 6 per 1,000 litres (in Bangalore).

11. But if we charge for water, won't the poor suffer?

Firstly, we must realise that it is the rich who are taking advantage of the enormous subsidy today. The larger the consumption, the greater is the subsidy and the greater is the cost of pollution.

But it can be argued that water should be free for all. Or free up to a certain amount for all. In this context, the South African model, which makes it incumbent on the state to provide 6,000 litres per month per household, is a possible model for India to adopt as well (see box: *Basic minimum water reserved for all in South Africa*). Make water a right. Make the right to clean water a right.

12. How can legislation help in ensuring clean water for people?

Legislation will only make it a right, which will then require enforcement. But by mandating the quality of water that Indians have the right to, we can force agencies to take their business much more seriously. It will also give Indians the right to demand clean water — this again will provide for the necessary push for water quality improvement.

In other words, the country needs a 'safe drinking water act' that makes the provision of water — up to a certain defined quantity — a fundamental right of all Indians. Also, it provides for standards which define the 'potability' of water, so that not just the right to water, but also the right to clean water is enunciated.



OK...today's orders. 50 crates to parliament, 6 each to MP's homes, a dozen to the Governor's bungalow, 30 to the Ministry of water resources...

10**ANNEXURE**

FOR COMMENTS ONLY

DOC: FAD 14(1552)C

Draft Indian Standard

**READY-TO-SERVE NON-ALCOHOLIC BEVERAGES —
SPECIFICATION***(Third Revision of IS 2346)***Not to be reproduced or used as
STANDARD without permission of BIS****Last Date for Comments 31-08-2004**

This Indian Standard (*Third Revision*) would be adopted by the Bureau of Indian Standards, after the draft finalized by the Drinks and Carbonated Beverages Sectional Committee and approved by the Food and Agriculture Division Council.

In a tropical country like India, the ready to-serve non-alcoholic beverage industry has an important place. The quality of such beverages depends on the quality of the various ingredients that go in its manufacture — water, fruits and vegetable juices, acidulants, sweetening agents, emulsifiers and stabilizers, flavours, colour and carbon dioxide being the most important ones. The hygienic conditions of the units producing these beverages also need vigilant control to safeguard public health.

This standard was originally issued in 1963 and first revised in 1973, in which maximum permissible limits of those ingredients which in excess could adversely affect human health were specified.

In the second revision in 1992, the scope of this standard was widened to include beverages for dietetic purposes, containing electrolyte mixtures, flavoured and sweetened carbonated water with or without fruit juice, fruit pulp and fruit concentrates, keeping in view the existing trade practices. Several requirements on ingredients have been updated in order to bring the standard in line with existing regulatory requirements and manufacturing practices.

In this third revision the scope of this standard has been further widened to include all ready to-serve non-alcoholic beverages whether carbonated or not, sweetened or not, with or without specified fruit/vegetable juice, and any other ready to serve non-alcoholic, non dairy beverage.

In view of the different varieties of carbonated and non-carbonated beverages produced in the country, it has not been possible to include in the standard the exact or even the range of proportions of different ingredients required for the different varieties of the beverages.

In the preparation of this standard, due consideration has been given to the *Prevention of Food Adulteration Act, 1954* and the *Rules* framed thereunder. Due consideration has also been given to the *Standard of Weights & Measures (Packaged Commodities) Rules, 1977*. However, this standard is subject to restrictions imposed under these, wherever applicable.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2:1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Draft Indian Standard

READY-TO-SERVE NON-ALCOHOLIC BEVERAGES — SPECIFICATION

(Third Revision of IS 2346)

1 SCOPE

This standard prescribes the requirements and the methods of sampling and tests for water based ready to-serve non alcoholic beverages. The scope of this standard does not include medical beverages, pure fruit/vegetable juices, or those containing or derived from dairy products.

2 REFERENCE

The Standards listed in Annex A contain provisions which through reference in this text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards.

3 TYPES

- a) Flavoured and sweetened, carbonated/non-carbonated beverages.
- b) Carbonated water or soda water with or without permitted flavours.
- c) Flavoured and sweetened/unsweetened, carbonated/non-carbonated with dietetic/electrolyte mixtures in formulation.
- d) Sweetened/unsweetened carbonated/non-carbonated water with fruit/vegetable juice (only beverages containing up to 10 % juice), fruit/vegetable pulp and fruit/vegetable concentrates with or without added flavours.
- e) Ready-to-serve decaffeinated, sweetened/unsweetened, carbonated/non-carbonated beverage with or without added flavours.
- f) Any other non-dairy based ready to serve beverage

4 INGREDIENTS

- 4.1 Ready to-serve non-alcoholic beverages may be prepared from the ingredients listed under 4.1.1 to 4.1.30 or any other which shall meet the requirements of the relevant Indian standard or statutory requirements, as the case may be.
- 4.1.1 Water (IS 14543 or IS 13428)
- 4.1.2 Sugar (IS 1151 or IS 5982)
- 4.1.3 Liquid Glucose (IS 873)
- 4.1.4 Dextrose Monohydrate (IS 874)
- 4.1.5 Invert Sugar
- 4.1.6 Fructose
- 4.1.7 Lactose (IS 1000)
- 4.1.8 Fruit and Vegetable Extractives
- 4.1.9 Honey, Grade special or A (IS 4941)
- 4.1.10 Artificial Sweeteners — As permitted under the *Prevention of Food Adulteration Rules, 1955*.
- 4.1.11 Flavouring Agents — As permitted under the *Prevention of Food Adulteration Rules, 1955*.
- 4.1.12 Food Colours — As permitted under the *Prevention of Food Adulteration Rules, 1955*.
- 4.1.13 Acidulants (citric acid, fumaric acid, sorbitol, tartaric acid, phosphoric acid, lactic acid, ascorbic acid, malic acid): As permitted under the *Prevention of Food Adulteration Rules, 1955*.
- 4.1.14 Clouding Agents — As permitted under the *Prevention of Food Adulteration Rules, 1955*.
- 4.1.15 Edible Gums such as guar, karaya, xanthan, arabic, carboxymethylcellulose, carrageenan, tragacanth, gum ghatti. As permitted under the *Prevention of Food Adulteration Rules, 1955*.
- 4.1.16 Edible Gelatin, Albumin, Licorice and its Derivatives — As permitted under the *Prevention of Food Adulteration Rules, 1955*.
- 4.1.17 Ester Gum (glycerol, ester of wood rosin) As permitted under the *Prevention of Food Adulteration Rules, 1955*.
- 4.1.18 Salts of Sodium, Calcium and Magnesium

- 4.1.19 *Foaming Agents* — As permitted under the Prevention of Food Adulteration Rules, 1955.
- 4.1.20 *Emulsifying and Stabilizing Agents* — As permitted under the Prevention of Food Adulteration Rules, 1955.
- 4.1.21 *Sequestering and Buffering Agents* — As permitted under the Prevention of Food Adulteration Rules, 1955.
- 4.1.22 *Vitamins and Minerals* — As permitted under the Prevention of Food Adulteration Rules, 1955.
- 4.1.23 *Sodium Bicarbonate, Food Grade* (IS 2124)
- 4.1.24 *Edible Common Salt* (IS 253 or IS 7224)
- 4.1.25 *Caffeine* (IS 11911) — The Quantity of caffeine shall not be more than 145 mg/kg. In case of energy drinks, where caffeine is added as stimulant and not as a flavour, the caffeine content more than 145 mg/l may be allowed and labelling requirement shall be as given in the note of clause 7.
- 4.1.26 *Quinine Salts* — conforming to Indian pharmacopoeia, not exceeding 100 mg/kg calculated as quinine sulphated.
- 4.1.27 *Preservatives* — As permitted under the Prevention of Food Adulteration Rules, 1955.
- 4.1.28 *Anti-oxidants* — As permitted under the Prevention of Food Adulteration Rules, 1955.
- 4.1.29 *Antifoaming Agents* — As permitted under Prevention of Food Adulteration Rules, 1955.
- 4.1.30 *Carbon dioxide* — conforming to Grade 2 of IS 307.

5 REQUIREMENTS

5.1 Hygienic conditions

Ready to-serve non-alcoholic beverages shall be manufactured in factories maintained in hygienic conditions accordance with IS 5837. A check list for good hygienic practices and food safety system for packaged water processing units given in Annex B.

5.2 Description

Ready to-serve non-alcoholic beverages shall be free from insect and rodent contamination, and shall be free from other extraneous matter. Clear beverages shall be of sparkling clarity and shall remain so when stored under normal conditions. The cloudy beverages shall be stable.

5.3 Flavour

The Ready to-serve non-alcoholic beverages shall have a well-balanced and pleasant flavour. The beverages of the flavoured type shall be free from all off- flavours and off-odours.

5.4 Sugar content

In the case of sweetened beverages containing no artificial sweetener, except spiced beverages, the product on being tested after removal of the carbondioxide shall record a brix hydrometer/refractometer/densitometer value of not less than 8 degrees at 20°C.

5.5 Carbonation

The beverages may be carbonated with carbon dioxide conforming to the Grade 2 of IS 307 to a pressure in accordance with their character. The carbonated beverages shall, however, have a minimum of one volume of carbon dioxide. A recommended method for the measurement of gas volume is given in Annex C.

Note: The gas volume is the amount of carbon dioxide the water will absorb at the normal atmospheric pressure at 15.56°C.

5.6 Microbiological Requirements

- 5.6.1 *Escherichia coli* (or thermotolerant bacteria) shall be absent in any 250 ml sample when tested in accordance with the method given in IS 5887(Part 1)* or IS 15185.
- 5.6.2 *Coliform*, bacteria shall be absent in any 250 ml sample when tested in accordance with the method given in IS 5401(Part 1)* or IS 15185.
- 5.6.3 *Faecal streptococci and Staphylococcus aureus*, shall be absent in any 250 ml sample when tested in accordance with the method given in IS 5887 (Part 2)* Streptococci (Enterococci) may also be tested by the method specified in IS 15186.

- 5.6.4 Sulphite reducing anaerobes, shall be absent in 50 ml sample when tested in accordance with the method given in Annex C of IS 13428.
- 5.6.5 Pseudomonas aeruginosa, shall be absent in 250 ml sample when tested in accordance with the method given in Annex D of IS 13428.

5.6.6 Aerobic Microbial Count

The total viable colony count shall not exceed 100 per ml at 20 to 22°C in 72 h on agar-agar or on agar-gelatin mixture, and 20 per ml at 37°C in 24 h on agar-agar when tested in accordance with the methods given in IS 5402.

- 5.6.7 Yeast and Mould shall be absent in 250 ml sample when tested in accordance with the method given in IS 5403.
- 5.6.8 Salmonella and Shigella shall be absent in any 250 ml sample when tested in accordance with the method given in IS 5887 (Part 3)* and IS 5887 (Part 7) respectively. Salmonella may also be tested by the method specified in IS 15187.
- 5.6.9 Vibrio cholera and V. parahaemolyticus, shall be absent in 250 ml sample when tested in accordance with the method given in IS 5887 (Part 5).

Note: In case of dispute, the method indicated by ‘*’ in 5.6.1 to 5.6.3 and 5.6.8 shall be reference method.

- 5.7 The material shall also conform to the requirements given in Table 1.
- 5.8 The maximum limit of the pesticide residues for pesticides as given in Annex D shall be as follows:

SI No.	Parameters	Limits
i)	Pesticide Residues considered individually	Not more than 0.0001 mg/litre
ii)	Total Pesticide Residue	Not more than 0.0005 mg/litre

- 5.8.1 The analysis for pesticide residues shall be conducted by a recognized laboratory using internationally established test methods.

- 5.9 Product Durability
Product durability shall be declared on the container as per clause 7.1 h). It shall be based on in-house shelf life study and proper checks and records be maintained for the conformity of the declared product durability.

6 PACKING

6.1 Containers

The Ready to-serve non-alcoholic beverages shall be filled in glass containers conforming to IS 1107. It may also be filled in cans, sachets, food grade plastic containers conforming to relevant Indian Standard and tetrapacks.

- 6.2 All returnable containers in which ready to-serve non-alcoholic beverages are packed shall be cleaned and sanitized according to 4.1 of IS 5837.
- 6.3 The containers shall be filled under strictly sanitary conditions (IS 5837). After filling, the containers shall be hermitically sealed with clean, new crown corks or caps conforming to IS 1994.

6.4 Inspection of Empty and Filled Containers

Containers, both before and after filling, shall pass for inspection before a brightly illuminated background and be viewed, if necessary, under magnification. Automatic inspection be specially designed units may also be employed. Defective containers or products shall be rejected.

7. MARKING

- 7.1 The container or label on the container or the crown/cap shall legibly bear the following information:
 - a) Name of the product;

- b) Name and address of the manufacturer;
- c) Date of manufacture;
- d) Batch number;
- e) Net volume of content;
- f) Direction for storage;
- g) Brand name, if any;
- h) Best before information; and
- j) Any other markings required under the *Standards of Weights and Measures (Packaged Commodities) Rules, 1977*, and the *Prevention of Food Adulteration Act, 1954* and the Rules framed thereunder

Note: In case of energy drinks where caffeine content is more than 145 mg/l, following labelling requirement shall be applicable:

- a) The label on the package of formulated caffeinated beverage must include advisory statements to the effect that:
 - i) The beverage contains (mention amount) caffeine; and
 - ii) The beverage is not recommended for:
 - children
 - pregnant or lactating women; and
 - individuals sensitive to caffeine
 - iii) Consume no more than [amount of one-day quantity (as cans, containers or ml)] per day
- b) The label for the date of expiry (month and year to be specified)
- c) Label also in Hindi and one regional language

7.2 Labelling Prohibitions

- 7.2.1 No claims concerning medicinal (preventative, alleviative or curative) effects shall be made in respect of the properties of the product covered by the standard. Claims of other beneficial effects related to the health of the consumer shall not be made unless true and not misleading.
- 7.2.2 The name of the locality, hamlet or specified place may not form part of the brand name unless it refers to ready to-serve non-alcoholic beverages processed at the place designated by that brand name.
- 7.2.3 The use of any statement or of any pictorial device which may create confusion in the mind of the public or in any way mislead the public about the nature, origin, composition and properties of ready to-serve non-alcoholic beverages put on sale is prohibited.

8 SAMPLING

- 8.1 Representative sample of the material shall be drawn as prescribed in Annex E.

9 TESTING

- 9.1 Test shall be carried out as prescribed in the appropriate appendices specified in the clauses. (To be added after the parameters are finalized).

9.2 Quality of Reagents

Unless otherwise specified, pure chemicals shall be employed in test, and distilled water (see IS 1070) shall be used wherever the use of water as a reagent is included.

Note: 'Pure chemical' mean chemicals that do not contain impurities which affect the results of analysis.

Table 1 Requirements for Ready-to-Serve Non-Alcoholic Beverages

(Clause 5.7)

Sl No. (1)	Characteristic (2)	Requirements (3)	Method of Test, Ref to (4)
A. Organoleptic and Physical Parameters			
i)	Colour	Agreeable (GMP)	
ii)	Odour	Agreeable (GMP)	
iii)	pH	2.3 – 8.5 IS 3025(Part 11)	
iv)	Taste	Agreeable (GMP)	
B. Parameters Concerning Substances Undesirable In Excessive Amounts including Toxic Substances			
i)	Aluminium, mg/l, Max	0.03	IS 3025(Part 55) or IS 15302*
ii)	Alkalinity, mg/l, Max	200	IS 3025(Part 23)
iii)	Arsenic, mg/l, Max	0.01	IS 3025(Part 37)
iv)	Antimony (as Sb), mg/l, Max	0.005	Annex G of IS 13428* or IS 15303
v)	Barium, mg/l, Max	1.0	Annex F of IS 13428* or IS 15302
vi)	Borate (as B), mg/l, Max	5.0	Annex H of IS 13428
vii)	Cadmium, mg/l, Max	0.01	IS 3025(Part 41)
viii)	Chromium (total), mg/l, Max	0.05 – Total including Hexavalent chromium	Annex J of IS 13428
ix)	Copper, mg/l, Max	0.05	IS 3025(Part 42)
x)	Chloride, mg/l, Max	200	IS 3025(Part 32)
xi)	Calcium, mg/l, Max	75	IS 3025(Part 40)
xii)	Cyanide, mg/l, Max	Absent	IS 3025(Part 27)
xiii)	Fluoride, mg/l, Max	0.5	Clause 23 of IS 3025
xiv)	Iron, mg/l, Max	0.1	IS 3025(Part 53)* or IS 15303
xv)	Lead, mg/l, Max	0.01	IS 3025(Part 47)
xvi)	Manganese, mg/l, Max	0.1	Clause 35 of IS 3025
xvii)	Magnesium, mg/l, Max	30.0	IS 3025(Part 46)
xviii)	Residual Free Chlorine, mg/l, Max	0.2	IS 3025(Part 26)
xix)	Mercury, mg/l, Max	0.001	IS 3025(Part 48)
xx)	Nickel, mg/l, Max	0.02	Annex L of IS 13428
xxi)	Nitrate (as NO ₃), mg/l, Max	45	IS 3025(Part 34)
xxii)	Nitrite (as NO ₂), mg/l, Max	0.02	IS 3025(Part 34)
xxiii)	Selenium, mg/l, Max	0.01	IS 3025(Part 56) or IS 15303*
xxiv)	Sulphate, mg/l, Max	200	IS 3025(Part 24)
xxv)	Sulphide, mg/l, Max	0.05	IS 3025(Part 29)
xxvi)	Silver, mg/l, Max	0.01	Annex J of IS 13428
xxvii)	Sodium, mg/l, Max	200	IS 3025(Part 45)
xxviii)	Tin, mg/l, Max	100	—
xxix)	Zinc, mg/l, Max	5.0	IS 3025(Part 49)
xxx)	Polychlorinated biphenyls (PCB's, Arochlor), mg/l, Max	Not detectable	Annex M of IS 13428
xxxi)	Polynuclear aromatic hydrocarbons, mg/l, Max	Not detectable	APHA 6440
xxxii)	Phenolic compound, mg/l, Max	Absent	IS 3025(Part 43)
xxxiii)	Mineral Oil, mg/l, Max	Absent	IS 3025(Part 39)
xxxiv)	Anionic surface active agent (as MBAS), mg/l, Max	0.2	Annex K of IS 13428
C. Radio-Active Residues			
i)	'Beta' Emitters, Bq/l, Max	1.0	IS 14194(Part 1)
ii)	'Alpha' Emitters, Bq/l, Max	0.1	IS 14194(Part 2)

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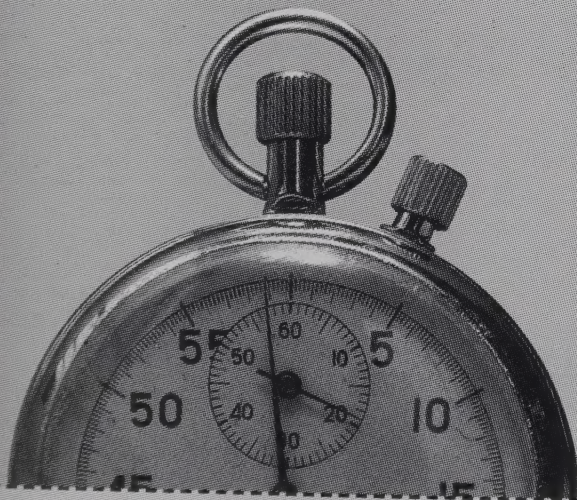
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